GOVERNMENT OF BOMBAY.

REPORT

ON THE

WORKING OF THE DEVELOPMENT DIRECTORATE

For the Year Ending 31st March 1923.

00133188

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BOMBAY.

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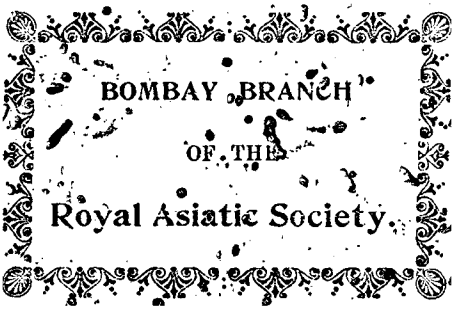

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00133188

REPORT ON THE WORKING OF THE DEVELOPMENT DIRECTORATE
For the Year Ending 31st March 1923.

DURING the year 1922-23 the work of the Directorate proceeded smoothly and, for practical purposes, according to programme. Generally speaking, the policy adopted is to push the reclamation and housing schemes with all speed; but in regard to suburban development, both for residential and industrial purposes, to proceed cautiously, pending improvement of communications and trade conditions, and the resulting creation of a greater demand for land outside Bombay.

BACK BAY RECLAMATION.

2. *Estimated Cost of the Reclamation.*—The detailed project estimate, amounting to Rs. 7,02,43,521 nett, was sanctioned by Government in October 1922, the figure being almost exactly the same as that on which the information supplied to the Indian Merchants' Chamber in September 1921 was based. There is, therefore, no change in the previous forecast of cost per square yard. Much depends on the time required for the execution of the project, and, as to this, all that can be said at present is that the indications are that a somewhat shorter period will be needed than was at first estimated. The actual expenditure up to 31st March 1923 amounted to Rs. 2,79,91,168.

3. *Khandivli Quarry.*—The crusher plant with the necessary siding accommodation was completed during the year under review, and was brought into use in October 1922. Measures to improve the water-supply were continued and nine wells in all have been sunk, eight of which have proved successful. The storm-water drains to be built into the reclamation are to be constructed of moulded concrete blocks, and it was decided to provide a block yard at Khandivli for the purpose of making them. The work was put in hand in January and was 75 per cent. completed by the end of the year. It is estimated that the yard will be capable of turning out 2,400 cubic feet of pre-cast blocks per day. 106 additional 20 ton side tipping wagons were received and put into use during the year, making a total of 238 of these wagons available. The sides and ends of all the wagons were raised by 12 inches, thus increasing the capacity by 30 per cent. One new six-wheeled

locomotive was also received during the year. Except for an unfortunate outbreak of plague, due to an imported case, the general health of the workmen at the Quarry was better than in the previous year, there being considerably less malaria and dysentery than in 1921-22. The plague seriously affected work during January and February, and the output was reduced during these months to 30 per cent. below normal. Altogether there were 10 cases of plague, of which 7 died. 1,700 persons were inoculated. The total output of the Quarry for the year amounted to 235,839 tons.

4. *Marine Lines.*—By September 1922 the timber used in the first section of the gantry had been removed and stacked on shore. The completed first section of the wall was unaffected by the monsoon, and the settlement of the rubble mound was less than had been expected. Work on the second section of the gantry was commenced on 4th October 1922 and the season's programme of 3,000 lineal feet of new work, containing 95,640 cubic feet of timber, was completed on the 5th February 1923, a rate of progress of 750 lineal feet per month. Two culverts for storm water drainage were constructed, as well as a culvert of special design to pass the submarine cables of the Eastern Telegraph Company under the wall. At the end of the year, 65,375 tons of rubble had been deposited on the second section of the wall, the mound being completed to an average distance of 3,450 from zero. Work on the extension of the mass concrete wall proceeded simultaneously, 4,16,430 cubic feet of concrete were deposited and a further 2,800 lineal feet completed by the end of the year. Amongst minor works undertaken, a footpath 15 feet wide was constructed from Charni Road to Marine Lines, to meet the wishes of the Municipality, and this was connected by a seven feet footpath to the overbridge, south of Marine Lines Station. Three shelters were also built for the convenience of the public using the footpath. The 20-ton portal crane referred to in paragraph 12 of last year's report was in course of erection at the end of the year. In addition to the needs of the Marine Lines Section itself, a large amount of traffic in stone, railway materials, etc., for the Colaba Section was handled in the Marine Lines Yard. Up to the present the sea walls at Marine Lines and Colaba have followed alignments curving in opposite directions, and without a reference to the plan, it has not been easy to visualise the outline of the completed work. During next season, however, the walls at both ends will begin to approach each other on the straight, when a much clearer idea will be afforded as to the extent of the reclaimed area it is proposed to add to the city.

DĀNDA

Scale 40 Feet to 1 Inch

SALS

SURVEYED IN 1923-32

EN COPY.

SETTE

Preliminary Edition 1923

No VII

SHEET No SW6 39

NO SW6 38

SHEET NO SW6 40

PALLADIA ROAD

NA 101

NA 266

NA 87

NA 83

NA 91

NA 83

NA 326

CS 2

REFERENCES AND SYMBOLS

BOUNDARY OF HOLDINGS

BOUNDARY PILLAR

BUILDING WITH 1, 2 AND 3 STOREYS

" WITH COVERED PASSAGE

" WITH STORE ON PORTICO

" WITHOUT ROOMS ON PORTICO

" TEMPORARY

CITY SURVEY NUMBER

DRAIN, OPEN

FOOTPATH

GARDEN PLOT

LAMP POST LP

CS 9
CS 6
CS 10
CS 14
CS 15
CS 17
CS 18
CS 19
CS 23
CS 32
CS 35
CS 36
LP
NO SWB/60.
RESERVOIR
SHED
PALM
WALL
WELL
SUPERINTENDENT

№1

PLAN

SHEWING ORIGINAL AND
VILLE-PARLE TOWN PLAN

SCALE 100 FEET TO

NOTE :— The Plots held by Owners prior to the carrying out o
dotted block outline and numbered in Block, while th
in return are shewn by Red outline and numbered

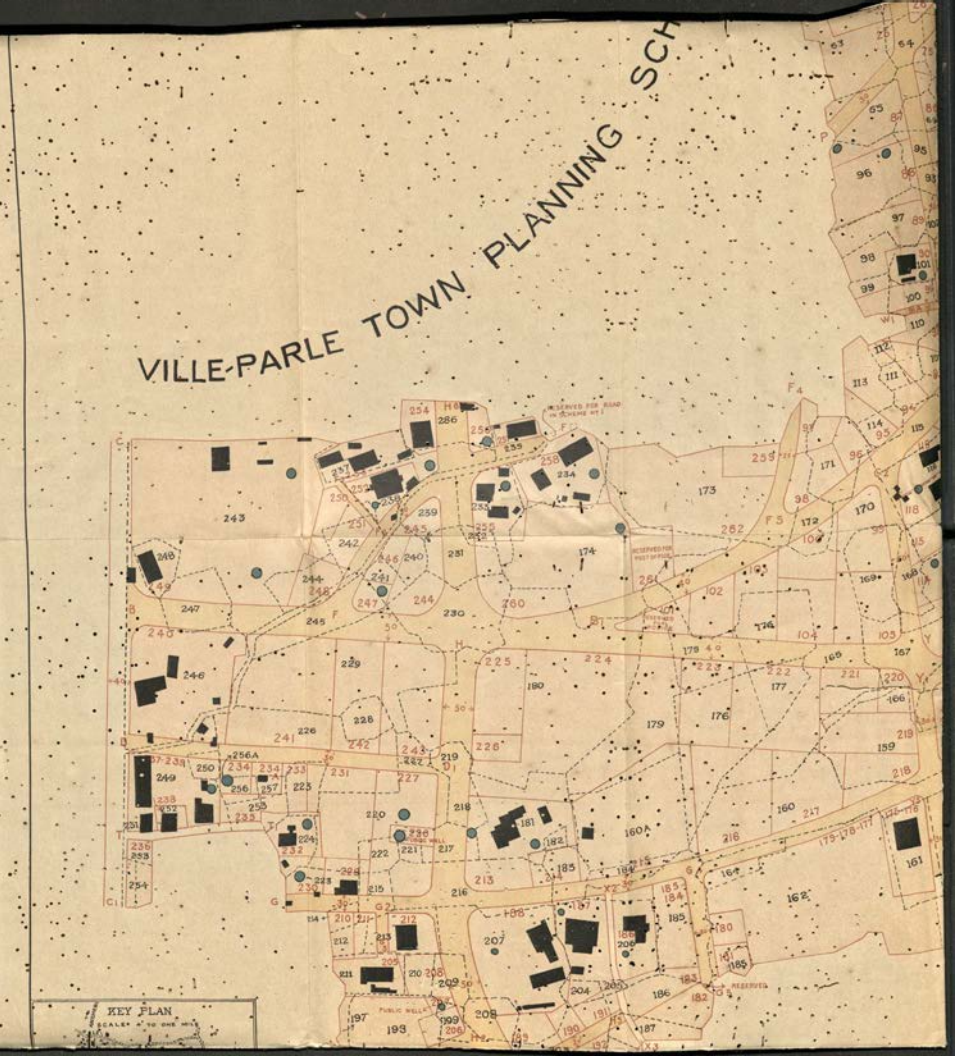
EME No. 1.

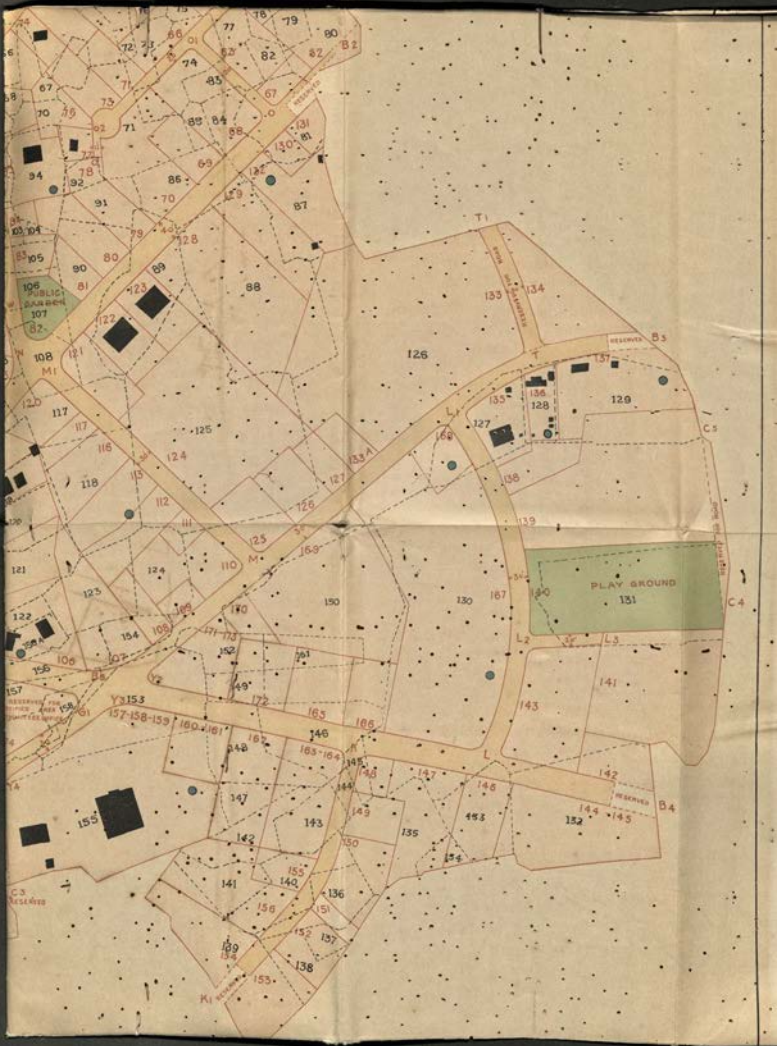
FINAL PLOTS.
NING SCHEME Nº 2.

1 INCH.

the Town Planning Scheme are shown by
Developed Building Plots given to them
in Red.

VILLE-PARLE TOWN PLANNING SCH




PUBLIC GARDEN
PLAY GROUND
RESERVED
RESERVED
RESERVED

VILLE PARTIE
DU SCHEME N°8

196
204
195
203
194
202
200
201
193
205
200
202
198
197
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196
192
190
189
195
H3 RESERVED FOR ROAD
H2 RESERVED
DRAIN.

E. M. Gilbert - Lodge

F.S.I. F.I.A. F.A.I.
ARBITRATOR.

HATE & Co Litho BYCULLA BOMBAY.

BURBAN SCHEME Nº VI

DANDA

SCALE 100 FT. 1 INCH

Nº III

B.R.A. Browne

Superintending Engineer,
Nº2 Project Division.

KAPE & Co Litho BYCULLA BOMBAY

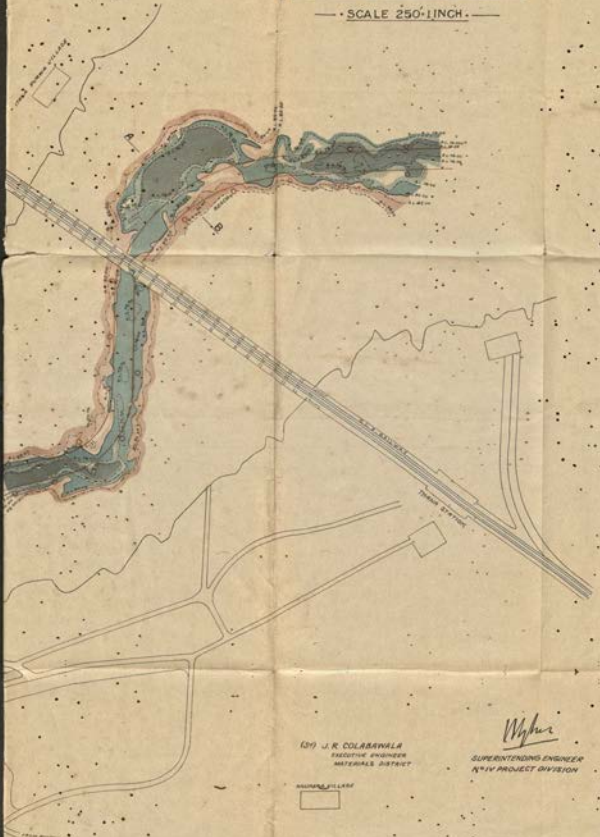
Su

NOTE:- Scheme boundary is shown by dotted red lines.

CROSS SECTION OF THANA CHANNEL ON LINE A.B.
SCALE 20 = ONE INCH

PLAN OF
THANA CREEK
SHOWING THE NEW 100 FEET CHANNEL & BEACONS

SCALE 250'-1 INCH



(Sd) J. R. COLABAWALA
EXECUTIVE ENGINEER
MATERIALS DISTRICT

SUPERINTENDING ENGINEER
No IV PROJECT DIVISION

KATE & CO BYCULLA BOMBAY

No IV

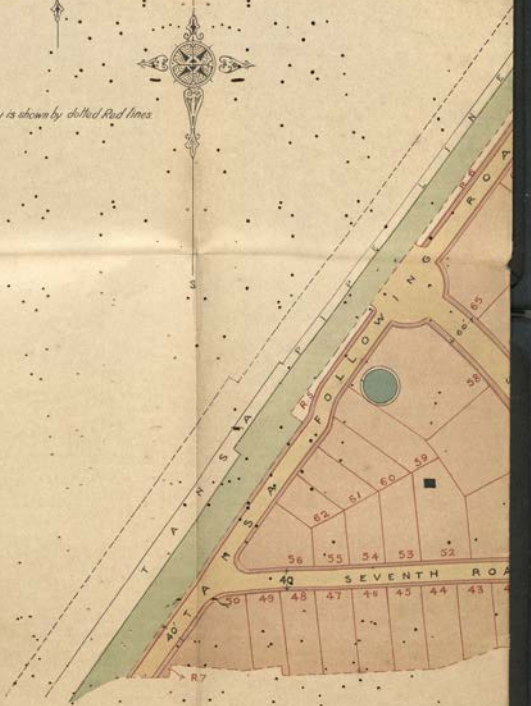
SUB. SCHEME XVIII. KIROL

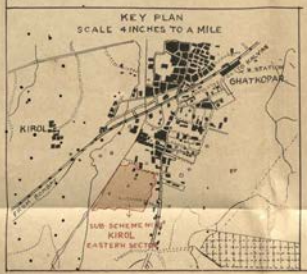
EASTERN SECTOR.

SCALE 100' TO AN INCH.

N

NOTE: Scheme boundary is shown by dotted Red lines.





E. M. Gullett-Lodge

F.S.I., F.I.A., F.A.I.

Land Manager

DEVELOPMENT DIRECTORATE

NATE & Co Litho BYCULLA, BOMBAY.

5. *Colaba.*—By the end of September 1922, the first section of the mass concrete wall, founded directly on the reef, had been completed to 2,040 feet from zero, and arrangements were put in hand to construct the rubble mound on which the further extension of the wall is to be built. The method adopted is to construct a narrow mound by end tipping, the subsequent widening being accomplished by the ordinary side tipping wagons. During the year 50 end tipping wagons were obtained for the purpose, and the preliminary work included the provision of a transhipping station at Colaba for loading the end tipping wagons, with the necessary sidings. The railway from Marine Lines to Colaba was completed during the year, 3·73 miles of track being constructed on rubble bank with the necessary culverts. In addition, a large amount of work was done in rearranging the crushing and mixing plants to suit the altered conditions. The tipping of the rubble mound was commenced early in March, and a length of 1,779 feet had been finished by the end of the year. The programme contemplates the completion of 3,800 feet before the monsoon of 1923, and work on the continuation of the mass concrete wall will then be commenced and will, it is expected, be completed to 5,800 feet from zero by September 1923. Work was in hand at the end of the year on the foundations of the first storm-water drain, which will follow the line of the road forming the northern boundary of the Military area, and a rubble cross wall will subsequently be built on this alignment to enable the filling of the area to be commenced next November. Of minor works undertaken, a considerable amount of additional accommodation was provided for the labour employed, with coolie camps, sanitary arrangements, etc.

6. *Dredging and Pumping Plant.*—The dredger "Sir George Lloyd" and the intermediate station, "Colaba", were laid up during the year, as was also the dredger "Kalu", purchased from the Ministry of Munitions. The floating pipe lines and pontoons were put together and arrangements were made to moor them for safety in a sheltered creek between Hog Island and Sheva Island. A slipway was under construction on Sheva Island to enable the sections of the pipe line to be hauled up for examination and painting, whilst accommodation was provided for the necessary staff and stores for maintenance purposes. Arrangements were also made for the construction in India of the necessary auxiliary craft required in connection with the dredging, such as tugs, launches, waterboats, crane-barges and anchor-boats. Arrangements were in progress at the end of the year for laying the first pipe line across Colaba, and the permission of the Bombay Port Trust was obtained to

the construction of a rubble mound on the harbour foreshore down to low water mark. The top of the mound will be about 2 feet above H.W.O.S.T., and the shore pipe will run along it to the low tide limit, whence a suitable flexible connection will join the shore pipe to the floating pipe line, through which the dredged material will be pumped from the dredger. A gangway will run along the floating pipe line giving communication between shore and dredger, and the floating pipe line will be lighted by electric light to obviate damage from or to shipping in the harbour at night. Telephone communication between the dredger and the shore will also be installed. These and many other details were engaging the attention of the Chief Engineer, Reclamation Branch, and his officers, at the close of the year, in view of the commencement of pumping next season.

7. *Sanitary Committee.*—In January 1923 Government appointed a Sanitary Committee, consisting of the following gentlemen, to act until the completion of the reclamation works, with a view to advise Government as to the sanitary precautions which should be taken from time to time in connection with these works :—

Chairman.

LIEUT.-COLONEL R. M. CARTER, C.B., F.R.C.S., D.T.M., I.M.S.

Members.

THE DIRECTOR, BOMBAY BACTERIOLOGICAL LABORATORY.

DR. HERMAN GAREY VENIS, L.R.C.P., L.R.C.S., D.P.H. (Ire.)

THE EXECUTIVE HEALTH OFFICER, BOMBAY MUNICIPALITY.

CAPTAIN J. R. D. WEBB, O.B.E., I.M.S.

KHAN BAHADUR DR. NUSARWANJI HORMASJI CHOKSEY, C.I.E., M.D., L.M.&S., F.C.P.S.

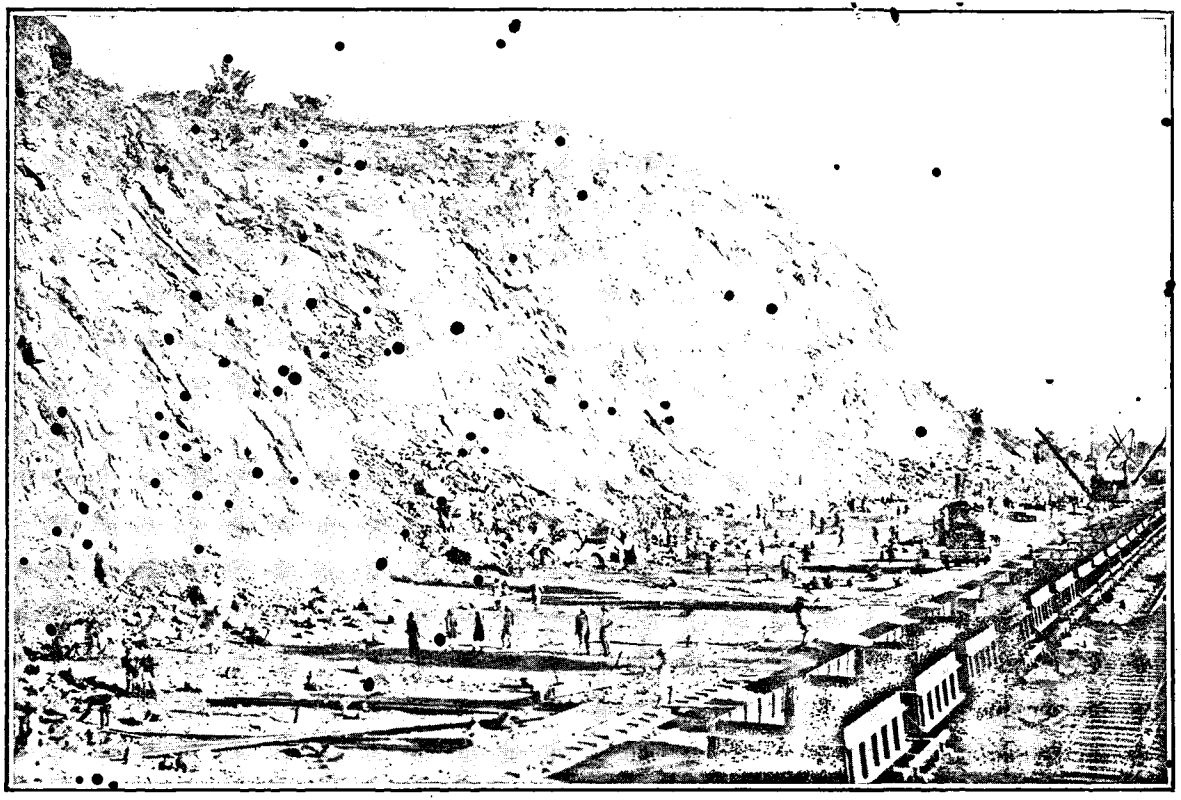
DR. HORMASJI MANEKJI MASINA, F.R.C.S. (Eng.), L.M.&S.

LIEUT.-COLONEL RAGHAVENDRA RAO, O.B.E., M.D. (Lon.)

DR. PHIROZ ARDESHIR DALAL, L.M.&S., D.T.M.&H. (Camb.).

DR. KAVASJI BYRAMJI SIROFF, L.M.&S., D.P.H., D.T.M.

On the recommendation of the Committee a whole-time Sanitary Officer has been appointed, who will be responsible not only for the control of anti-mosquito operations, but also for the general sanita-



Kandivli Quarry, showing stone being loaded into side tipping waggons. The photograph may be compared with that facing page 2 of last year's report.

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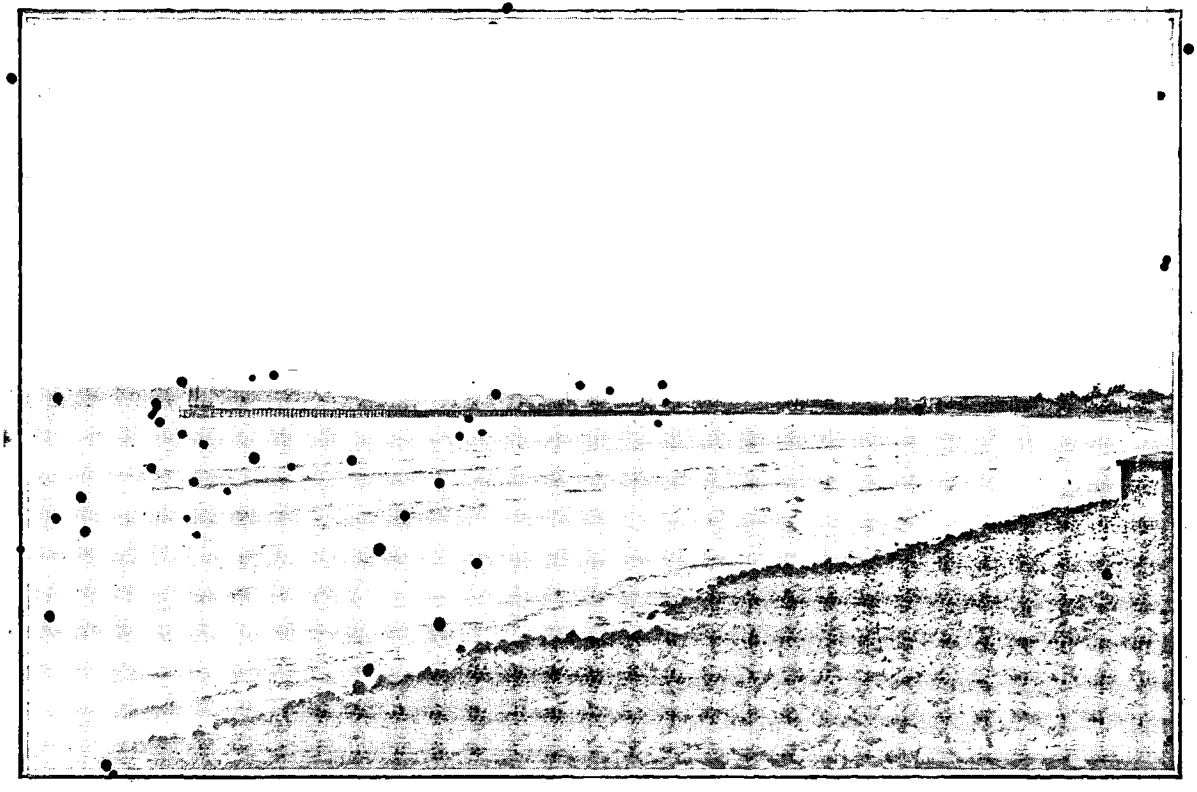


Distant view of Marine Lines wall. Gantry completed to 5,100 feet from zero.

tion of the reclamation areas and for the medical attendance provided for the workmen. An anti-malarial staff, consisting of a Sanitary Inspector, Sub-Inspector and 12 coolies, has also been employed and the necessary accommodation with office and laboratory equipment is being provided. Further, at the request of the Committee, arrangements are being made by the Chief Engineer, Reclamation Branch, for the preparation of experimental beds of the material to be dredged for the purpose of testing various larvacides, etc. Finally, on the recommendation of the Committee, the Government of India have been requested to allow Lieut.-Colonel S. R. Christophers, C.I.E., O.B.E., I.M.S., Assistant Director, Central Research Institute, Kasauli, to advise the Committee on points connected with anti-malarial measures, on which they may desire to consult him.

9. *General.*—Sir George Buchanan, K.C.I.E., with Mr. W. T. Halcrow of the firm of Messrs. Meik and Buchanan, visited Bombay during the cold weather, when a number of technical matters were discussed with the Chief Engineer, Mr. Ll. W. Lewis, C.I.E. The works were inspected in detail by Sir George Buchanan, who submitted to Government a report on the progress made with the scheme, and on the programme for the future. Mr. W. R. Davidge, F.S.I., A.R.I.B.A., Consulting Town Planner, also spent about two months in Bombay during the cold season and, with Sir George Buchanan, considered various matters affecting the layout, the storm-water drainage system, the level of the parapet wall and other details. No modification of the preliminary layout already published is at present contemplated, but future plans will provide for a 40 feet promenade. Apart from this, the general layout of roads and open spaces remains the same, but the question of the actual use to which the various building areas is to be put, is a matter for consideration at a later date.

EAST COLABA RECLAMATION.

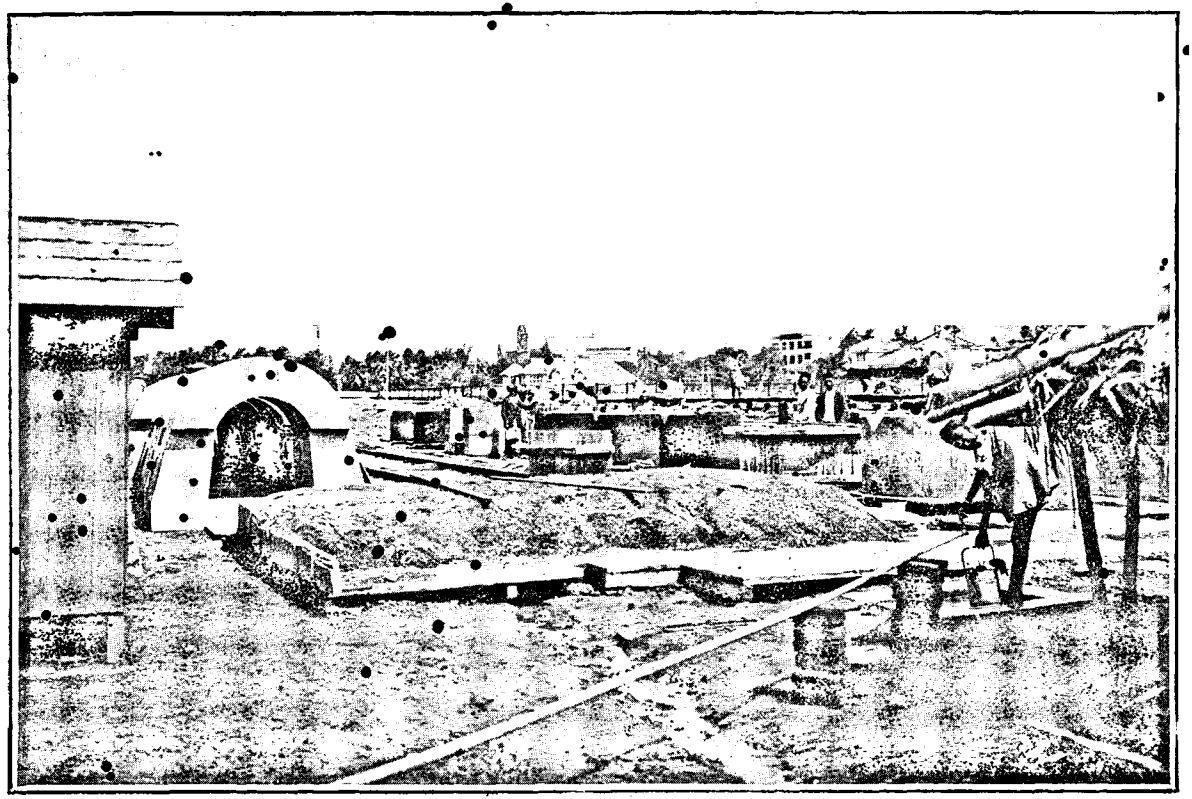
10. No work was done on the East Colaba Reclamation during the year, but preliminary arrangements were made with the Military Department and the Municipality, for the construction of a siding from the Marine Lines-Colaba Railway across the isthmus, near the Afghan Memorial Church, to enable stone to be brought to the site when construction commences. The opportunity was taken of the presence of Sir George Buchanan and Mr. Davidge to fix the final alignment of the sea wall of this reclamation.

INDUSTRIAL HOUSING IN BOMBAY.

11. The programme provides for the completion of 60 chawls by 31st March 1923, against which the equivalent of 56 had been finished on that date. There was thus a shortage of 4 chawls at the end of the year, but as there was a shortage of 6 chawls on 31st March 1922, the construction carried out during the year under review was equivalent to 47 chawls against the programme figure for the period of 45. It had been hoped to complete the full 60 chawls by 31st March 1923, but it was not possible to do this on account of the decision to change over to the contract system, which change was effected during the year. Now that work on all contracts is in full swing, it is anticipated that there will be no difficulty in making good the deficiency during the current year. The total number of tenements let, or ready to let, on 31st March 1923, was 2,720.

12. As reported last year, the land in possession of the Directorate is sufficient to accommodate 195 chawls or 15,600 tenements and since work is now vigorously in progress, it will soon be necessary to arrange for more land. It has been decided to lease land from the Bombay Port Trust in the vicinity of the New Cotton Depôt at Sewri, for the erection of 8 chawls or 640 tenements and work will probably be commenced next working season. In March 1924, the Improvement Trust hope to be able to have ready at Dharavi an area sufficient for 90 chawls, or 7,200 tenements; and by March 1925, land at Sewri-Wadala sufficient for 80 chawls or 6,400 tenements. During the year a considerable area, about 200 acres, of the salt pans near Kowli, was investigated with a view to subsequent filling and use for industrial housing. But it is not intended to put work in hand in this area in the immediate future, and it will only be utilised if sufficient land is not forthcoming in other parts of the Island nearer the industrial centres.

13. In addition to the construction of the actual chawl buildings, a large amount of work was done during the year in connection with essential services such as roads, water-supply, sewage and storm-water drains. Owing to lack of pressure in the Municipal mains, and to the want of low level sewers of adequate capacity in the neighbourhood of the chawl areas, it has been found necessary to instal temporary arrangements for pumping water to chawl roofs, as well as those necessary for the drainage and disposal of the sewage of the areas under occupation. The conditions referred to are not likely to be rectified for some



Marine Lines, showing pre-cast concrete sections for storm-water drains and culverts.

years, and must entail considerable additional work and expense to admit of the buildings being occupied.

14. During the year, the system of construction by Departmental agency was, as already mentioned, abandoned in favour of the contract system. The former method had much to commend it during the initial stages of the scheme, but, once the necessary experience had been gained, the latter became preferable as more economical. The three main contracts let were as follows :—

(*a*) 23 chawls at Naigaum plot B, to Messrs. Chotani & Co., at Rs. 88,379 per chawl.

(*b*) 80 Chawls at Worli to Messrs. "The Bombay Concrete Construction and Engineering Co." at Rs. 88,466 per chawl.

(*c*) 21 chawls at Worli to Messrs. Gaya & Co., at Rs. 89,216 per chawl.

The result of the tenders is satisfactory and shows considerable reduction on previous costs. It is likely, however, that further reduction will be effected in future and that the average cost per tenement over the scheme will be reasonable. The rates quoted are for the building, containing 80 tenements, complete with sanitary fittings. The tender of the Bombay Concrete Construction and Engineering Company was based on a new design providing for the pre-casting of floor slabs in addition to walling and partition blocks, a system which has the advantage of speedy erection, better workmanship, and lower cost. It is anticipated that, in all future chawl work, this or some similar system of construction will be adopted. The framework, consisting of the columns and beams, is now the only part of the building which is cast *in situ*.

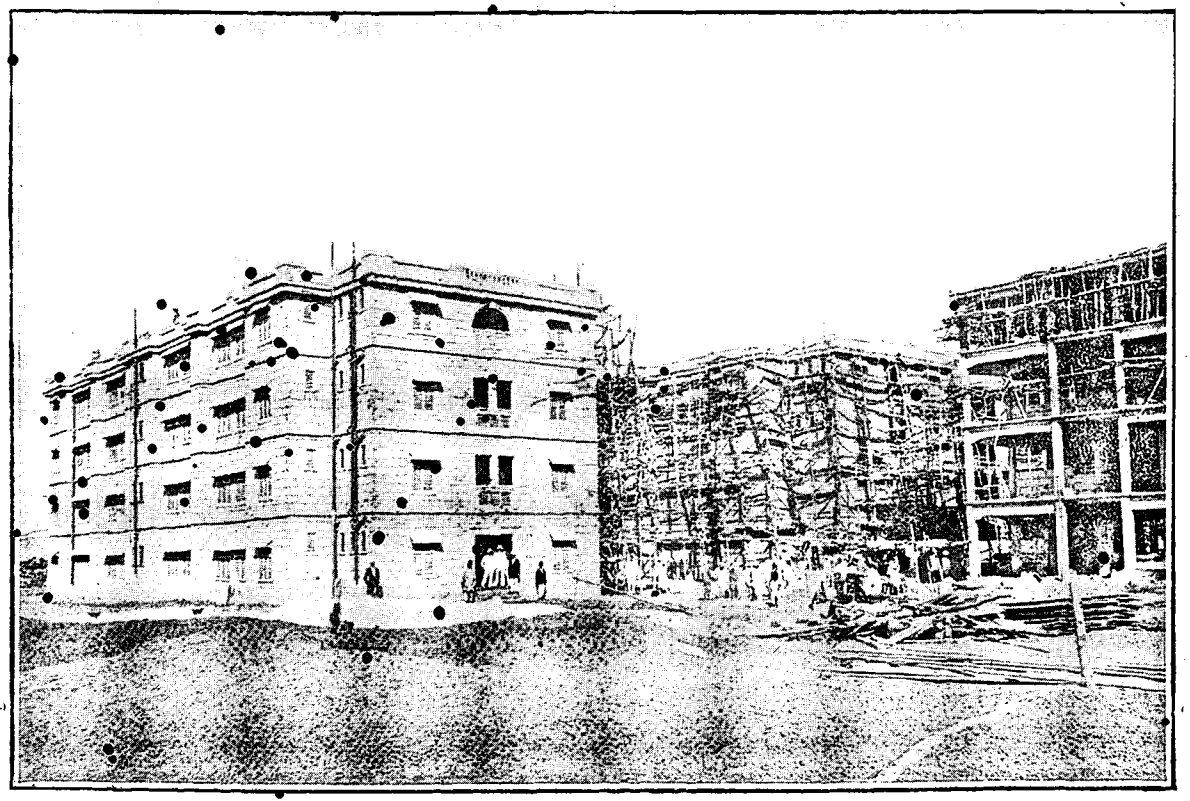
15. *Criticism of Design.*—It is not unnatural that the design of the chawls should have evoked some criticism, both from tenants and from others. So far as the tenants are concerned, the main cause of complaint has been the absence of nahanis in the rooms at DeLisle Road and Worli, a group of nahanis having been provided in the centre of each floor instead. The nahani, it may be explained, is merely a small washing place, with sink and waste pipe connected to the drainage system. There are objections, on sanitary grounds, to the provision of separate nahanis in each room, for it is common knowledge that

they are used as urinals. The Health Officer of the Municipality is opposed to them and nahanis are not fitted in the rooms of chawls built by the Municipal Corporation for their employees. The Improvement Trust, on the other hand, have always provided them, and there is something to be said for the view that, whatever the sanitary objections may be, expedience demands a recognition of the customs and prejudices of the people, and that it is better to make some sacrifice of principle rather than promote dissatisfaction among the tenants.

16. Another complaint of the tenants relates to the nuisance caused by the smoke from the fireplaces or chulas. This is a defect common to all single room tenements in Bombay, and one which it is not easy to deal with. Chimneys are not provided in such tenements as a rule, but the Directorate design of chawl has a chimney to each tenement. Unfortunately, however, in many of the rooms the tenants insist on building two, three, or even more chulas, and the question is how to direct the smoke from all of them up the one chimney, a problem which is rendered more difficult by the custom of the tenants of building the chulas anywhere on the floor, with little or no reference to the position of the chimney.

17. These questions were fully considered by the officers of the Directorate and by the Advisory Committee and the latter decided, by a majority, to recommend to Government that nahanis should, in future, be provided in each room. They also recommended the adoption of a small loft for storing firewood, which the Engineers found it possible to combine with a sort of canopy, connecting with the chimney, below which there would be room for three chulas, the smoke from which would be directed by the canopy up the chimney. These additions are estimated to cost an additional Rs. 121 per room, mainly on account of piping, etc., connected with the nahanis, and the proposals were under consideration by Government at the close of the year.

18. The criticism of persons other than tenants has partly been directed against the tenement building in general. The chawls have been referred to as "mere boxes for the herding of hands conceived as means of production" and as "a mere mechanical repetition of a single plan." It may be conceded at once that the provision of "cottage homes" would have been far preferable, had it been economically possible. But unfortunately the cost of land in Bombay, and the amount of land available, render such an idea impracticable; and for years the single room tenement building has been accepted as the only practical solution



Industrial Housing Scheme. General view of completed chawl.

of the housing of the poorer classes in Bombay. In a large scheme such as that in progress, the "repetition of a single plan" is clearly indicated if due regard is to be paid to economy; and the best that can be done is to design a chawl in which the more glaring defects of the older types are eliminated. Light and ventilation, plenty of open space round the buildings, proper sanitary arrangements and continuous water-supply to all floors, may be taken to be the main essentials; whilst the tenement itself must be protected from direct sunlight and rain and be constructed with due regard to privacy.

19. In the design which has been adopted it is claimed that the above essentials, together with the somewhat difficult conditions imposed by financial limitations and by the customs and prejudices of the people, have been very fairly met. There is no desire, however, to suggest that the buildings are ideal, and the question of the details of the design is still being studied with the help of the Advisory Committee and of the tenants themselves. Perhaps the most definite criticism has been that directed against the windows of the rooms, a detail which presents special difficulties. Any one who is acquainted with the existing chawls in the city is aware that the windows are constantly kept closed with gunny or matting, a practice which, it has been found from enquiry, is due to a desire to exclude direct sunlight and rain, and to secure privacy.

The windows of the Directorate chawls have been designed specially to meet the wishes of the tenants in this respect, and from numerous enquiries it is found that they are considered suitable, and little or no tendency has been observed to block them in the usual fashion. The Advisory Committee propose to consider the design again during the monsoon when a further canvass of the views of the tenants will be made.

20. A suggestion has been put forward that the roofs of the chawls should be made available for tenants to sleep or walk about on. This is purely a question of expense, as it would be necessary to strengthen the roof and its supporting columns, to continue the staircase on to the roof with suitable protection from rain, and to provide a substantial parapet to obviate the danger of children falling over. The cost would, it is estimated, be equivalent to an additional Rs. 50 per room, and in view of the large open spaces provided between and around the chawls, it is not considered that the extra expense would be justified. If money were no object, there are many improvements which might be made, the most important of which is perhaps the provision of electric light. It is at night that the buildings are fully occupied, and the absence of light-

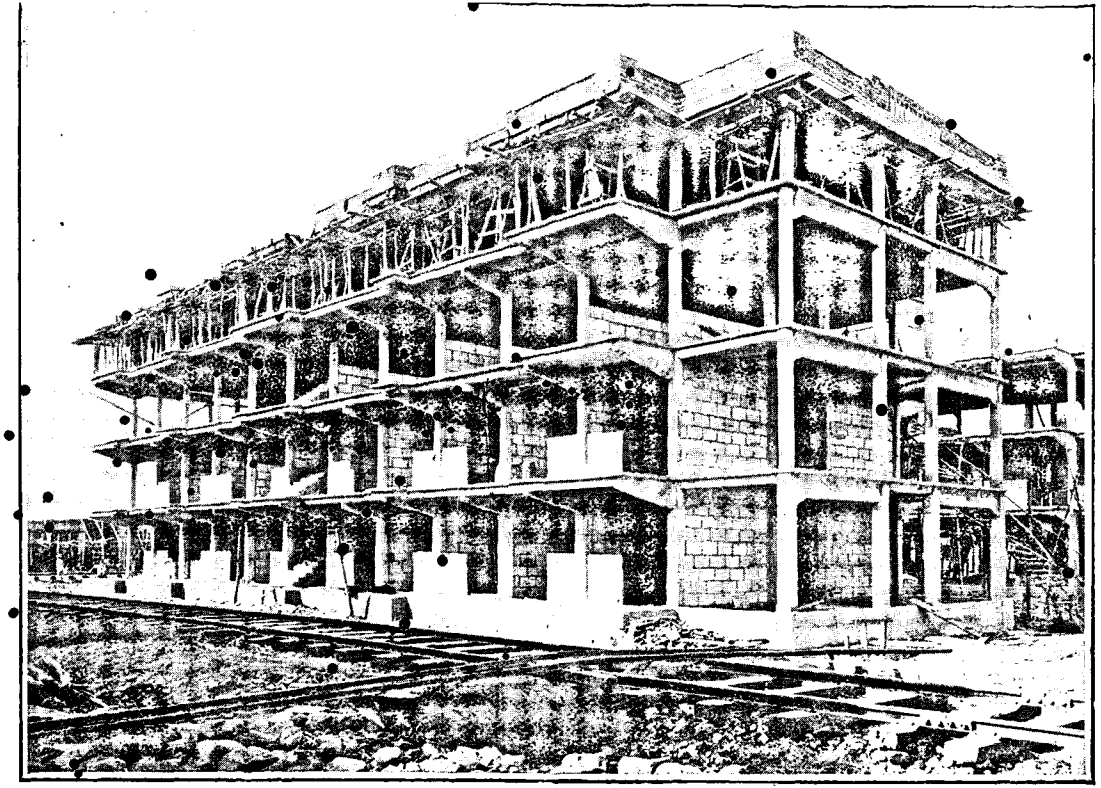
ing in passages, staircases, latrines, etc., undoubtedly lends much of the squalor which seems inseparable from the tenement block of ordinary type.

21. *The Question of Rent.*—The rent charged for the rooms has also been the subject of criticism, and it has been pointed out that many of the labouring classes now live in rooms for which they pay Rs. 4 to 5 per month, and it is asked how they can be expected to pay the much higher rent for the rooms in the Directorate chawls. The reply is that at the last census in 1921 there were 175,000 single room tenements in Bombay, the majority in old insanitary buildings in crowded localities separated from each other in many cases by a sweeper's gully only 2'-6" wide. It is not possible to construct, at present prices of land, materials and labour, modern sanitary buildings with large open spaces, such as those at Worli, at the same economic rent as the older types, and the additional accommodation now being provided will naturally be occupied by those who can best afford it, which will set free a number of the older, cheaper, rooms for the poorest classes.

22. An interesting sidelight is thrown on this question in a pamphlet on "The Housing Problem in 1922," published in October 1922 by Mr. Mancharjee E. Joshi, L.C.E., Hon. Secretary, Parsi Co-operative Housing Society, a well-known authority on the housing question. The following is a quotation from the pamphlet in question :—

> "Even the one-room tenement which the poor are occupying cannot be had to-day for less than Rs. 20 to 25. I have seen some newly built chawls on Soparibagh Road, which I and my worthy colleague Khan Bahadur Dr. J. K. Daji tried to secure for giving immediate relief to such of our poor and lower middle classes who were out in the streets for want of house accommodation, and what was the result? We had to give up all idea about it because of the rents being not less than Rs. 25 to 45 for one and two-room tenements, respectively, which was quite out of the question for the poor or lower middle to pay, with their income almost that amount. In one of the buildings, the rent of each room 12 × 12 only in the rear part of the building with no kitchen at all was Rs. 30, and that too if the whole building was rented on contract."

It has been ascertained that the buildings referred to are new buildings constructed by private agency since the passing of the Rent Act and, if the rents demanded represent the true economic rent, a comparison



Industrial Housing Scheme. Chawl with framework practically complete. Inner partitions in progress.

with the Directorate chawls is much in favour of the latter so far as economical construction is concerned.

23. There has been considerable confusion in regard to "economic rent," and it has been seriously contended that if a tenement costs Rs. 1,000 to build, and the money to build it is borrowed at 7 per cent., the rent should not exceed Rs. 70 per annum, or say Rs. 6 per mensem. The actual capital cost includes, besides the cost of the building, the cost of land, roads, drainage and water-supply, together with provision for establishment charges, *plus* interest on the expenditure during the period of construction. To the annual interest on the capital sum thus arrived at, must be added sinking fund to replace the buildings at the end of their assumed life, which gives the nett rent, or the nett income required to cover expenses. In the case of the Directorate chawls, the average nett rent is in the neighbourhood of Rs. 10 per mensem. There is then the question of "outgoings," *viz.*, repairs and management, Municipal taxes, vacancies, bad debts and insurance, and it is customary in Bombay to take outgoings as 33⅓ per cent. of gross rent. In other words the ordinary landlord must charge Rs. 15 per mensem to secure a nett rent of Rs. 10. In the case of the Directorate chawls the gross or economic rent is taken on the average at Rs. 14-8 per month, due to the fact that Government buildings are allowed a small concession in the matter of Municipal taxes. The detailed calculation of the economic rent of 1,520 tenements at Naigaum, plot A, is printed as Appendix A to this report.

24. Government, on the recommendation of the Advisory Committee, have decided, for the present, to charge an average minimum rent of Rs. 10, which corresponds to a loss per tenement of Rs. 54 per annum. The portion of the cotton cess available for meeting the loss on the scheme may be taken at Rs. 14½ lakhs per annum, which sum would cover the loss on something under 27,000 rooms, assuming the rents charged to remain as at present. The programme provides for the completion of 26,000 tenements by 31st March 1926, by which date, if not before, it will be necessary to consider three alternatives, an increase in the rents, an increase in the cotton cess, or a curtailment of the programme. The total expenditure on the Bombay Industrial Housing Scheme up to 31st March 1923 amounted to Rs. 1,25,66,252.

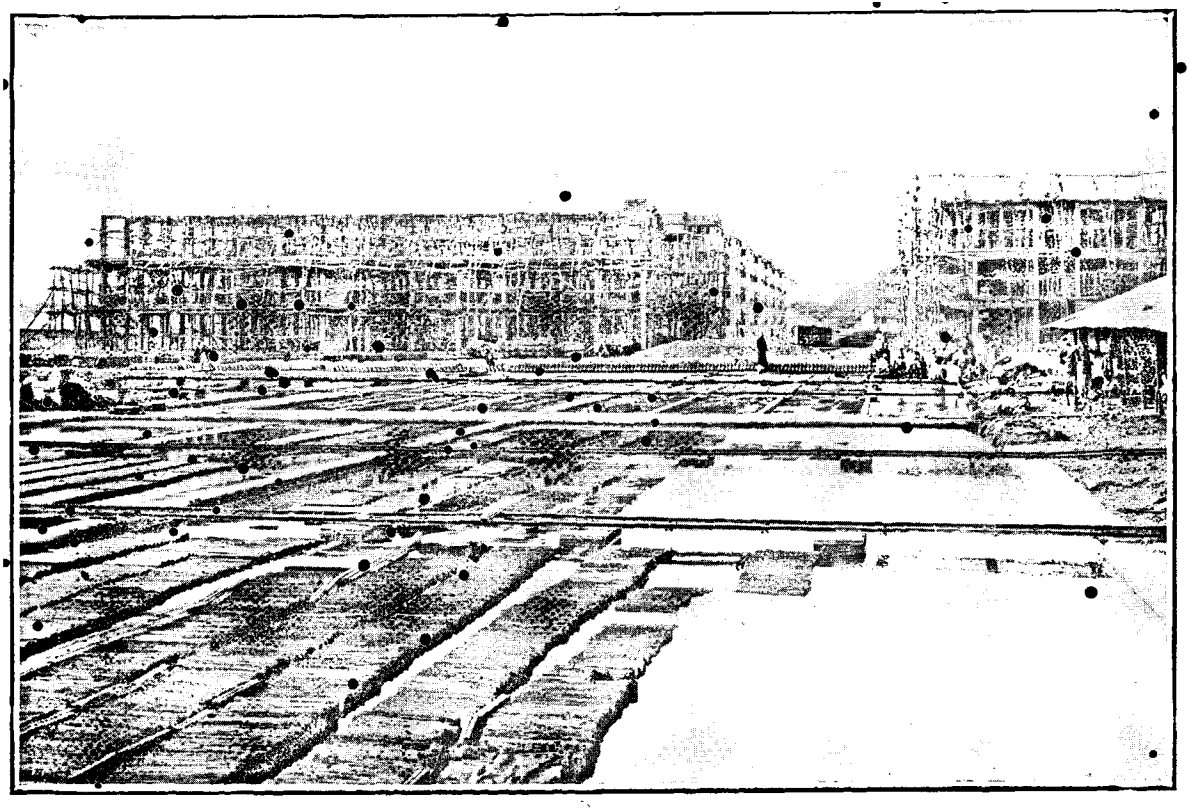
25. *Inauguration of the Industrial Housing Scheme.*—The Industrial Housing Scheme was inaugurated by His Excellency Sir George Lloyd, Governor of Bombay, at Worli on the 6th December 1922. The space

between chawls Nos. 12 and 13 had been decorated and arranged with the necessary seating accommodation for about 800 guests. His Excellency, on arrival, accompanied by Her Excellency the Hon'ble Lady Lloyd, was met by Sir Lawless Hepper, Director of Development, with the Hon'ble Sir Chimanlal Setalvad, Member of Council in charge of the Development Department, Mr. Mirza Ali Mahomed Khan, President, Bombay Municipal Corporation, and Mr. J. R. Martin, I.C.S., Acting Secretary to Government in the Development Department. The Members of the Advisory Committee and the officers of the Housing and Materials Divisions having been presented, their Excellencies were conducted to the dais. The Director then made an address describing the details and progress of the scheme, and requested His Excellency to accept a small memento of the occasion. His Excellency in reply dealt at length with the origin of the Industrial Housing Scheme and its various stages and expressed his appreciation of the manner in which Government had been assisted by the people of Bombay in raising the large amount of money required. A vote of thanks to His Excellency was moved by Mirza Ali Mahomed Khan. The ground floor of a neighbouring chawl, No. 10, had been fitted up as a museum to exhibit the various activities of the Development Directorate, and the different exhibits having been inspected by their Excellencies and the guests, the party repaired to the Worli sea-front, where tea was served in a tea garden arranged on a portion of the Improvement Trust new 80 feet sea-front road, which had kindly been made available by the Trustees for the purpose.

PROVISION FOR THE EXPANSION OF INDUSTRIES OUTSIDE BOMBAY.

26. *Suburban Scheme No.* 1—*Kurla Kirol.*—The layout of this scheme was revised during the year, mainly owing to the abandonment of the proposal to provide a siding from the G. I. P. Railway. It was found, after consultation with the railway authorities, that the siding would be expensive and difficult to work, and, in view of the proximity of the goods station at Ghatkopar, the conclusion was arrived at that it would be a better and more economical plan to improve the road communication between the area and the existing goods depot. No factory sites were let during the year, and the work of development consequently continued in abeyance.

27. *Suburban Scheme No.* 2—*Trombay North-East.*—The area is intended for the accommodation of offensive trades, and during the year 4·75 million c. ft. of filling was carried out in certain low-lying



General view of Industrial Housing Scheme at Worli. Tanks for seasoning walling and partition blocks in foreground.

lands, thus providing a compact block of 170 acres forming a conveniently situated site for the tanneries to be displaced from Dharavi. Separate areas have been allotted to the Bombay Municipality for the purpose of a new slaughter-house and for milch-cattle stables, and negotiations for their transfer were in progress at the end of the year. A complete layout for the whole area has been prepared by the Land Manager including the necessary provision for Industrial Housing.

28. *Suburban Scheme No. 22—Kurla-Trombay Railway.*—This was referred to in paragraph 23 of the last year's report, the object being to provide the necessary railway facilities for Suburban Scheme No. 2, dealt with in the previous paragraph. The survey and estimates were completed by the G. I. P. Railway during the year, the latter amounting to Rs. 13,23,792, which provides for the construction of a double line extension from a point on the existing siding 1·86 miles from Kurla, and also for doubling the first 1·86 miles of the existing siding. As the G. I. P. Railway are unable to find funds for this work at present, it was arranged that Government should finance the scheme in the first instance. It is considered, however, that a single line extension is all that need be provided to begin with, and an estimate amounting to Rs. 5,92,686 has been sanctioned for the purpose. It is also proposed that Government should acquire from the Municipality the first 1·86 miles of the existing siding, and negotiations to that end were in progress at the end of the year. The G. I. P. Railway have the option of taking over the whole line, when funds permit, recouping Government their expenditure, and in the meantime will work the line for actual costs, the receipts being paid to Government.

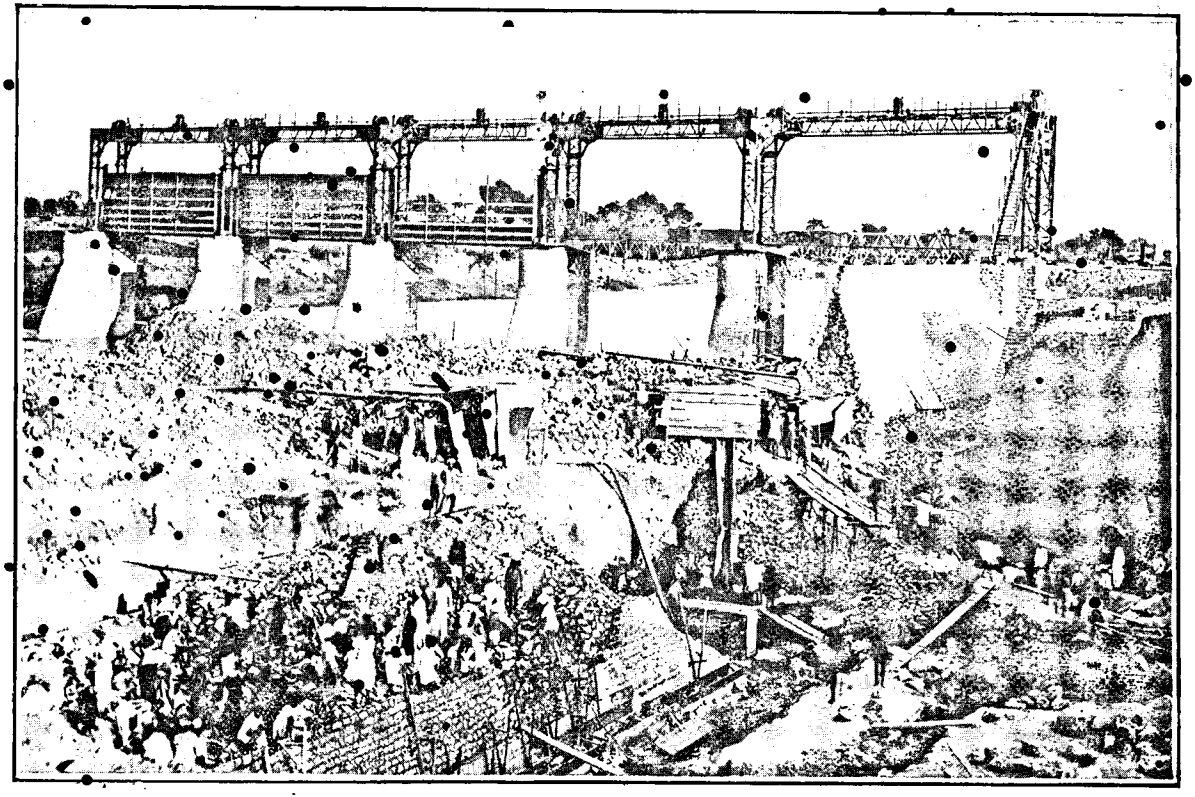
29. *Suburban Scheme No. 15—Ambernath.*—The first three factories were completed during the year, together with the necessary bungalows for the superior staff in charge of them. During the year the financial prospects of the scheme were re-examined on the basis of the following somewhat pessimistic assumptions, *viz.*, that from the 1st April 1923 no land in the scheme is sold for five years, and that thereafter the available factory sites are disposed of in the following ten years. On this assumption it is estimated that, at the price it is at present proposed to charge for land, Government will have a surplus of about 2·78 lakhs fifteen years hence, after allowing for compound interest on all expenditure at 7 per cent. throughout. Land in the area is at present offered at Rs. 2-8 per square yard for factory sites, and at 8 annas per square yard for industrial housing, but Government are not committed to charge these rates indefinitely, and higher prices may be obtainable

in the future. Several fresh enquiries for factory sites were received during the year, but the period under review was unfavourable to the expansion of industries. Meanwhile the work of development is practically in abeyance, and expenditure will in future be regulated strictly by the requirements of factories for which sites may be sold. During the year negotiations were completed for the transfer of a considerable area in the scheme to the Government of India for the purposes of a wireless installation, but owing to the necessity for retrenchment, construction has been postponed.

30. The temporary water-supply was still further improved during the year and a small chlorination apparatus was added to enable the water to be used for drinking purposes without danger, pending completion of the permanent filtered supply, which is now dealt with under a separate scheme. The full cost of the temporary supply is covered by charges for the sale of the water. A branch post office has been opened, together with a telephone exchange connected with the Central Exchange in Bombay. There are connections to the existing factories, and the installation is working satisfactorily. The medical arrangements have been perfected and there is a permanent medical officer in charge who also supervises and reports on the sanitation of the area. A Notified Area Committee has been formed and is now in operation.

31. *Suburban Scheme No.* 21—*Permanent Water-Supply at Ambernath.*—This is now dealt with as a separate scheme and the rates to be charged for water will be such as will cover the expenditure. The masonry work of the barrage across the Ulhas River was finished during the period under review, and the steel work was nearing completion at the end of the year. It is expected that the pump and filter houses will be ready by the end of 1923. The earthwork and bridges for the pumping main were finished by 31st March, and the main itself about three quarters laid. The permanent reservoir for the first supply of three million gallons daily, together with the delivery main, will be completed in October. It is not expected to commence supply from the permanent installation until February 1924 as, although the work could have been carried out quicker, the existing temporary supply is adequate for present requirements, and under the circumstances, it is more economical to proceed slowly, until the demand for factory sites improves.

32. *Suburban Scheme No.* 23.—*Supply of Electric Power at Ambernath.*—This is now also dealt with as a separate scheme on a self-



Barrage across the Ulhas River near Badlapur. Foundation of filter house in foreground.

supporting basis. The question of supply was under consideration during the year, but, as the owners of the existing factories finally decided to provide their own power, the matter did not assume any great urgency. A small amount of power will be required early in 1924 to operate the pumps at Badlapur, but a larger, and hence more economical scheme may be possible, if certain negotiations in progress result in increased demand.

TOWN PLANNING SCHEMES.

33. The progress with the preparation of town planning schemes during the year was satisfactory. Arbitration proceedings were completed in four schemes, Ville Parle Nos. 2 and 3, Santa Cruz No. 3 and Ghatkopar No. 1; whilst arbitration proceedings were about to be commenced in five schemes, Santa Cruz No. 4, Ghatkopar No. 2, Andheri No. 5, Malad No. 1, and Kandivli No. 1. In addition, arbitration proceedings were commenced during the year in the large and important scheme known as Bandra No. 3 which deals with an area of 235 acres including the whole of Khar village, an area having all the objectional features common to a densely overcrowded Gaothan, which it is proposed completely to remodel. Six new schemes were sanctioned during the year, in addition to those detailed in paragraph 34 of last year's report, *viz.*—

Santa Cruz	No. 5
Ghatkopar	No. 3
Bandra	No. 2
Andheri	No. 6
Ville Parle	No. 4
.. .. ..	No. 5

The average "betterment" payable by owners in town planning schemes varies between Re. 1 and Rs. 1-8 per square yard, those owners whose houses already front on *pukka* roads being, of course, charged proportionately less. In illustration of the method of carrying out a town planning scheme described in paragraph 32 of last year's report, a plan accompanies this report, Plate I, showing Ville Parle Town Planning Scheme No. 2 with the original and final plots superimposed. It will be seen at a glance how great an improvement is effected in the area by the provision of roads giving access to all the properties.

34. Although the preparation of town planning schemes proceeded satisfactorily, progress on those in the hands of the Engineers was un-

fortunately slow, owing to the inability of the Notified Area Committees concerned to provide in full the necessary funds. Work was actually in progress on the roads in four schemes, *viz.*—

Santa Cruz	No. 2
Ville Parle	No. 1
Andheri	No. 2
Malad	No. 1

Financial assistance is now being given to Notified Area Committees, where necessary in the form of loans from Development funds, and it is hoped that by this means more regular progress and consequently more systematic and economical working will be effected in the coming year.

35. *Santa Cruz Town Planning Scheme No.* 2.—The total expenditure incurred on this scheme up to the end of the year was Rs. 1,94,557, of which Rs. 40,174 was spent during the year under report. The total length of roads completed is some 11,500 lin. feet. Progress on the portion of the scheme lying in Juhu Island had to be deferred, as the land has not yet been made available. Further work on the Gazdar bund, which has an important bearing on this scheme, was delayed for want of funds. Provision for the completion of this work, and for the protection of the Juhu sea-face, within the limits of the scheme, has been made in a revised estimate.

36. *Ville Parle Town Planning Scheme No.* 1.—The total length of roads, and the area embraced by this scheme, are about 7,000 lin. feet and 38 acres, respectively, and the estimated cost of road construction is Rs. 67,177. The total expenditure incurred up to the end of the year was Rs. 55,301, some 5,600 lin. feet of roads having been practically completed and opened for traffic. The work had to be stopped temporarily for want of funds, but will shortly be resumed.

37. *Andheri Town Planning Scheme No.* 2.—The area covered by this scheme is 50 acres, and roads 4,700 feet in length have been constructed, 43,923 c.ft. of rubble and metal having been used. The estimated cost is Rs. 33,939 and the total expenditure up to the end of the year was Rs. 20,906.

38. *Malad Town Planning Scheme No.* 1.—This scheme develops about 20 acres of land in an important centre. Expenditure incurred during the year was Rs. 13,975 against the estimated cost of Rs. 35,556. Further progress is suspended until the Notified Area Committee can provide additional funds.

Suburban Scheme No. 3. Road construction in the new Garden Suburb at Chembur.

SUBURBAN SCHEMES.

39. A complete list of suburban schemes is given below:—

Serial No.	Designation.	Area-Acres.
1	Kurla Kirol	582
2	Trombay North-East	3,243
3	Trombay North-West	1,727
4	Trombay West	3,680
5	Malavni	448
6	Danda	22
7	Khar	177
8	Chapel Road, Bandra	28
9	Murzbanabad	77
10	Aerodrome near Gilbert Hill	300
11	Rann of Juhu	783
12	Bandra-Ghodbunder Road Widening	....
13	Salsette Drainage	....
14	Mogra	93
15	Ambernath	1,289
16	Shahar	3,367
17	Salsette-Trombay Railway	....
18	Kirol North.	53
19	Salsette Water-Supply	....
20	Khopoli	....
21	Ambernath Water-Supply	....
22	Kurla-Trombay Railway	....
23	Ambernath Electric Supply	....

Nos. 1, 2, 15, 21, 22 and 23 have already been dealt with in this report under "Provision for expansion for industries outside Bombay." The present position as regards the remainder will now be indicated.

40. *Suburban Scheme No. 3—Trombay North-West.*—Work on the Chembur sector of this scheme was commenced during the year. It covers 200 acres, the layout plan providing for a nett building area of 128·66 acres, and the construction of 9 roads was sanctioned to open up a small portion of the scheme, with a view to testing the demand for building sites in the neighbourhood. Settlements have been made with a number of land owners, the total area dealt with being about 3½ lakhs of square yards. In the majority of cases settlement has been effected by handing back to the owners a proportionate area of their original holdings in the form of developed building plots. Negotiations are also in hand with a considerable percentage of owners in this area, but

meanwhile all are allowed to continue the full and uninterrupted user of their lands no land being taken unless actually required for development works. It is intended for the present to sell the building plots to the public at Rs. 3-8 per square yard, which should encourage large numbers of residents in the crowded areas of Bombay City to move to this pleasantly situated district, which, with its well wooded and gently undulating contours offers pleasing seclusion from the daily life of a busy city. Thirty-four single storey cottages for housing the staff of the Directorate are in course of erection in the area. Of these, 8 are semi-detached buildings and 2 are detached cottages, whilst the remainder are in blocks of 4 units. Compact plans and an economical type of construction have been adopted and the remunerative rental values will range between Rs. 10 and Rs. 35 per unit per mensem including the cost of land. The buildings are of five types, and provide convenient and adequate accommodation for the various classes of the staff, including such conveniences as kitchens, store rooms, bath rooms and water-supply. The better types of quarters possess pleasing exteriors and will, it is hoped, serve to demonstrate to the public the possibilities of cheap and attractive housing for the middle and lower middle classes in this area. The construction has also commenced of a two storeyed 8-roomed bungalow estimated to cost Rs. 42,000, which is a very low figure for the accommodation provided. The bungalow is to be rented by an officer of the Directorate, and will serve as an example of the possibilities of economical housing for the upper middle classes in the attractive surroundings of the new garden suburb. As the new roads are approaching completion, the public of Bombay will be able to motor over the area and see for themselves the attractive character of the scheme. The forthcoming establishment of a passenger train service between Kurla and Chembur *via* the Municipal Kutchra Siding should do much to popularise this area. Assuming 6 years for the completion of the scheme, the total cost is estimated at Rs. 15,99,408 including compound interest at 7 per cent. throughout. The recoupment, on a conservative basis, is estimated at Rs. 22,04,488.

41. A layout plan for a second sector of Suburban Scheme No. 3 was approved during the year, known as the Pestomsagar Sector, which lies to the north of the Chembur section referred to above, and is flanked on the west by the Chembur-Ghatkopar Road. The area comprises 115 acres, and 16 acres have been allotted at the northern extremity for the lime-burners, who will eventually be displaced from the present site on the Sion-Chembur Road owing to the closing of the Kurla Creek by the Port Trust in connection with the pumping of petrol from Pir Pau to Sewri.

The only work undertaken in this sector during the year was the preparation of the new site for the lime-burners. The accommodation is provided on reclaimed ground and comprises a bunder, approach road, sites for kilns and a lime-stacking ground. A site for housing the lime-burners is also in course of preparation, for which an area of 3 acres is being reclaimed, and 4 roads of a total length of 1,900 feet are in hand. A copy of the layout plan of the Chembur and Pestomsagar sectors of Suburban Scheme No. 3 is shown on plate II accompanying this report. The total expenditure on both sectors up to 31st March 1923 amounted to Rs. 4,41,319.

42. *Suburban Scheme No. 4—Trombay West.*—No work was undertaken in this scheme during the period under review. The layout will depend to some extent on the decision of the Port Trust as to the location of future docks, and the development of the area is in abeyance for the present. No expenditure has been incurred on the scheme.

43. *Suburban Scheme No. 5—Malavni.*—Government own 448 acres of land in Malavni, which it is proposed to develop for residential purposes at some future date. So far the only work debited to this scheme, has been the repair of 3½ miles of the Malad-Marve Road at a cost of Rs. 99,000. The road carries the heavy traffic from the Kharodi quarries and will eventually serve the scheme, when developed.

44. *Suburban Scheme No. 6—Danda.*—This scheme was notified by Government in the Revenue Department in 1919 and 1920 for building residences for Government servants. Part of the land was sold to the B. B. & C. I. Railway for officers' quarters, and the balance was transferred to the Development Department to deal with on the understanding :—

(*i*) that the Development Department, after making the proposed extension of Turner Road, should give to the owners of the original holdings, if willing, developed plots as nearly as possible on the site of their original holdings on suitable terms ; and

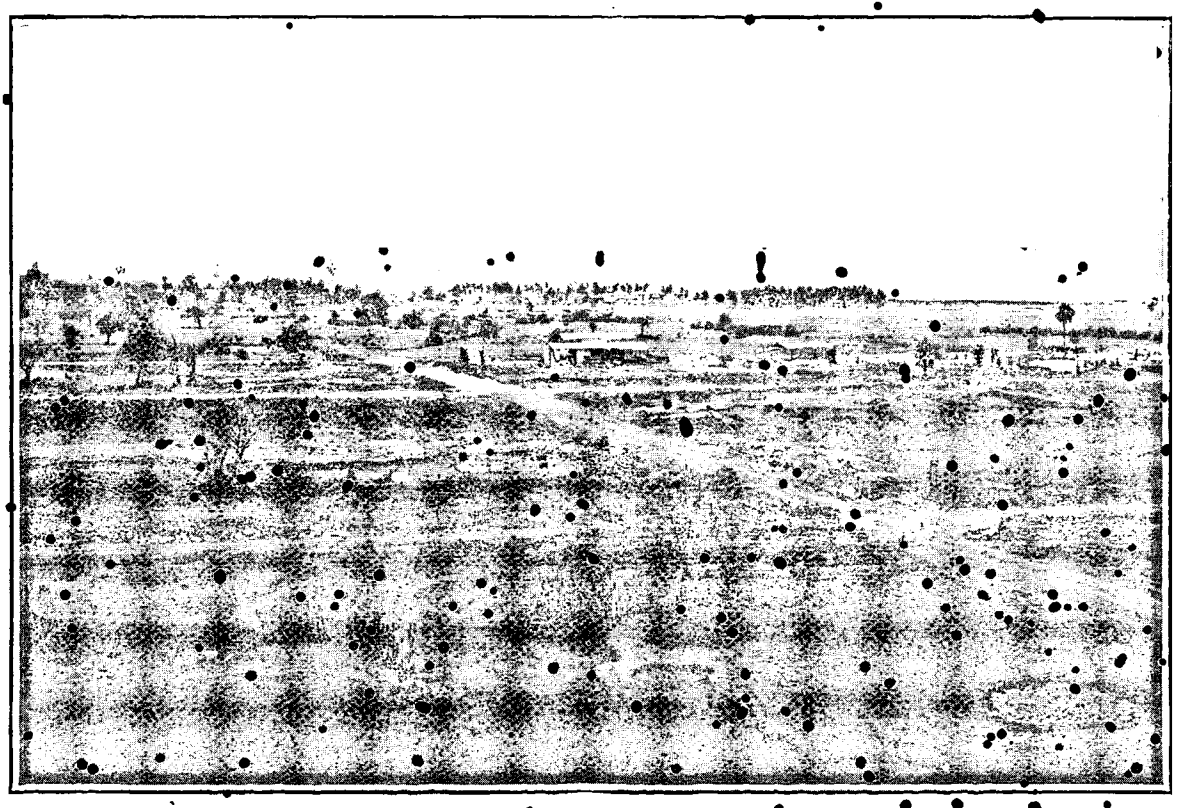
(*ii*) that the remainder of the area should be retained for offices or official residences to be constructed at the expense of Government.

A layout plan (plate III) was prepared and approved during the year, and it is proposed to negotiate with the original owners on the basis that one-third of the area will be retained by Government. No expenditure has been incurred on works.

45. *Suburban Scheme No.* 7—(*Khar*).—During the year the filling of certain low-lying land in this scheme, between the Bandra-Ghodbunder Road and the B. B. & C. I. Railway, was taken in hand, as well as a portion of the roads, sufficient to open up some 165 building plots, out of the total of 863. Of these 165 plots, 89 have been taken up by co-operative housing societies, *viz.*, 39 by the Laxmi Co-operative Building Society and 50 by the Pathare Prabhu Building Society, and the construction of houses was being started at the end of the year. Six plots have been sold to a building firm for the purposes of demonstrating the possibilities of cheap construction and design of houses, and two other building societies are negotiating for the purchase of large areas for their members. A site of 6,000 square yards has been reserved for a market near the future Khar Station, and a certain number of plots will be allotted to shops in the same neighbourhood. The roads constructed represent only a small part of the whole scheme, and further expenditure will be regulated by the demand for building plots in the area. Assuming 5 years for the completion of the scheme, the total cost is estimated at Rs. 36,18,184 including compound interest at 7 per cent. throughout. The recoupment is estimated at Rs. 41,30,534. The expenditure up to 31st March 1923 amounted to Rs. 14,96,974.

46. *Suburban Scheme No.* 8—*Chapel Road, Bandra.*—The roads in this scheme were under construction at the end of the year. The total nett building area in the scheme is 1,05,675 square yards, of which 79,200 square yards, or just over three-fourths, have been sold. Some 60 members of the San Sebastian Housing Society have expressed a desire to build houses without delay and a number of attractive designs for small bungalows are under consideration. The estimated cost of road construction is Rs. 83,746, of which items of the estimated value of Rs. 50,000 have been let on contract for Rs. 43,604. Assuming two years for completion, the total cost of the scheme is estimated at Rs. 2,41,179, including compound interest at 7 per cent. throughout. The recoupment is estimated at Rs. 2,95,049. The expenditure up to 31st March 1923 amounted to Rs. 1,26,374.

47. *Suburban Scheme No.* 9—*Murzbanabad.*—This is an area of some 83 acres adjoining Andheri, which marks the initiation of an interesting experiment in co-operative development as compared with the ordinary procedure under the Town Planning Act. The object of the scheme is to develop the area and reinstate the existing owners on their paying the cost of the scheme. A layout has been prepared, and the contribution



Suburban Scheme No. 7 (Khar), showing new roads under construction to the west of the Bandra-Ghodbunder Road.

which each owner would have to make is being worked out. To arrive at this, the original undeveloped value of his land is deducted from its final developed value, and a portion of the difference, sufficient to pay the development charges, is the contribution required. Before such a scheme can be submitted to Government, it is necessary that all owners should agree but, if this experiment should prove a success, it offers a method by which the wearisome proceedings under the Town Planning Act can, in selected cases, be avoided.

48. *Suburban Scheme No.* 10—*Aerodrome near Gilbert Hill.*—There were no fresh developments in connection with this scheme during the year, pending a decision as to the use of the area for purposes of civil aviation.

49. *Suburban Scheme No.* 11—*Rann of Juhu.*—The position of this scheme is as stated in the last report. It is not proposed to undertake development in the area at present.

50. *Suburban Scheme No.* 12—*Bandra-Ghodbunder Road Widening.*—The work of widening this road to 70 feet was completed during the year, including the demolition of the whole of the eastern frontage through Khar village. The road at this point was formerly a narrow straggling street barely 20 feet wide, offering an almost impassable barrier to traffic on this important main thoroughfare. The village is included in Bandra Town Planning Scheme No. 3, and the owners of the original structures have been allotted other plots on the new frontage line of the 70 feet thoroughfare. The bridge at Irla was also widened and the surface of the whole road generally improved, a further 2¾ miles being provided with a tar macadam coat. The total expenditure up to 31st March 1923 amounted to Rs. 5,78,987.

51. *Suburban Scheme No.* 13—*South Salsette Drainage.*—A number of drainage projects were under consideration during the year and plans and estimates for the drainage of Suburban Scheme No. 7 (Khar) were completed, whilst a similar scheme for Kurla was nearing completion. The whole of Mahim Creek and Bay was surveyed with floats to ascertain the probable effect of discharging sewage effluent from Suburban Scheme No. 7 (Khar) and Bandra into the creek. In addition, an estimate for the surface drainage of Andheri Gaothan, an extremely insanitary area, has been prepared. Rough proposals for the drainage of the Bandra Bazaar were discussed with the President of the Bandra Municipality, and are being considered by that body. As soon as a decision has been arrived at, plans and estimates will be prepared. No drainage work has been undertaken so far, and it will be understood that, except

possibly in so far as a drainage project may form part of the development of a suburban scheme financed by Government, the cost of drainage will fall ultimately on the local authorities of the areas served.

52. *Suburban Scheme No. 14—Mogra.*—In October 1919 certain land was notified by Government in the Revenue Department in the villages of Mogra, Majas, and Bandhivli for (*a*) the proposed Ismail College and (*b*) for model housing. The land reserved for model housing was granted by Government in the Revenue Department to two Co-operative Housing Societies, the Gaud Saraswat and the Hindu Friends' Housing Societies, at the actual cost of acquisition, on the condition that land should be reserved for roads at the cost of the Societies. Under the arrangement finally made, the Societies have to pay for their own roads, and are further liable for a certain period to contribute, up to a defined amount, for general development works calculated to benefit them. No such works are at present contemplated and there has been no expenditure against Development funds, except a small debit of Rs. 269 on account of surveys.

53. *Suburban Scheme No. 16—Shahar (Andheri Sector).*—This is an area of 190 acres with a frontage of 2,500 feet on the Andheri-Marol Road, bounded on the west by Andheri Station on the B. B. & C. I. Railway and on the south by the Salsette-Trombay Railway. It possesses the advantage of being practically an extension of the popular suburb of Andheri, with direct rail connection with Bombay. A layout plan was prepared during the year providing about 136 acres of building plots, after deducting the area required for roads and open spaces. The scheme was under consideration at the close of the year, with a view to a careful examination of the probable financial prospects, but has not so far been submitted to Government.

54. *Suburban Scheme No. 17—Salsette-Trombay Railway.*—On the Kurla-Vadauli section of 2 miles, 92 per cent. of the earthwork in the first mile and the whole of the earthwork in the second mile was completed by the end of the year, together with the masonry in all bridges, except one ten feet opening. A single line of permanent way in the second mile has been laid. An extension, southwards from Vadauli, which will subsequently form part of the main line, was taken in hand during the year to enable stone to be obtained from a quarry near Anik, where excellent road metal is available. About 85 per cent. of the earthwork on this extension had been completed at the close of the year. The earthwork and masonry of the Kurla-Andheri Section was practically finished, together with the permanent way for a single track for

the whole length, except three-quarters of a mile at the Kurla end, and 600 feet across the Mahim creek. Eight construction locomotives and 250 tip wagons were erected during the year, whilst 4 locomotives and 60 wagons were employed on construction of the railway itself, and on carrying road metal for Suburban Scheme No. 3; temporary sidings having been laid in the Chembur Sector of this scheme to facilitate the rapid delivery of material from quarries opened on Little Malabar Hill on the Sion-Chembur Road. During the year an estimate was received from the G. I. P. Railway, amounting to Rs. 6,58,850, of the cost of the overhead crossing at Kurla. The estimate received the approval of Government, and the work will be carried out by the G. I. P. Railway in due course.

55. *Suburban Scheme No.* 18—*Kirol North.*—A copy of the lay-out plan of the eastern sector of this scheme accompanies this report as plate IV. The area covers some 25 acres, of which 6½ acres will be absorbed by roads, and 10,000 square yards have been allotted as open spaces. A good deal of the earthwork was done during the year, the spoil being used for reclamation and roads in the new lime-burners' area, thus effecting a valuable saving in both schemes. The building plots will be sold at Rs. 5-8 to Rs. 6-8 per square yard, which compares favourably with the prices now ruling for land in the vicinity having similar amenities, whilst the proximity of Ghatkopar Station should ensure a ready market for the plots. Road-making had not been commenced at the end of the year. Assuming two years for completion the total cost of the scheme is estimated at Rs. 4,05,965 including compound interest at 7 per cent. throughout. The estimated recoupment is Rs. 4,79,523.

56. *Suburban Scheme No.* 19—*Salsette Water-Supply.*—The water-supply of Santa Cruz was maintained during the year, the demand rising from 40,000 to 85,000 gallons daily. This was fully met without laying any more piping, but the demand is still on the increase; and, although applications for enhanced supply are very closely scrutinised, it is expected that with the completion of Santa Cruz Town Planning Schemes Nos. 3, 4 and 5, the demand will go up considerably. The installation of filters at Tulsi is expected to reduce the pressure in the Tulsi main by as much as 33 per cent. and the present 6" pipe will then be insufficient to meet the increased demand. An estimate amounting to Rs. 1,75,684 has been prepared for still further improving the supply. All water supplied by the Directorate in Salsette and Trombay will be charged for, by meter measurement, at rates calculated to cover the rate paid to the

Bombay Municipality for the bulk supply, *plus* the cost of distribution. Rules for the supply of water, and for the collection of charges by the Directorate, were framed and sanctioned by Government during the year under report.

57. The work of supplying water to Suburban Schemes Nos. 2 and 3 Trombay was commenced by means of a 10″ pipe from the Vehar main. The main pipe line is about 4¼ miles (22,500 feet) long, whilst branches laid along the Ghatkopar-Chembur Road, and the roads under construction in Suburban Schemes Nos. 2 and 3, amount to 5 miles (27,500 feet). The estimated cost of the work is Rs. 2,94,506 and water was made available at most of the points in January 1923. Further branches, estimated to cost Rs. 90,250, are required for the supply of water to the portions of Suburban Schemes Nos. 2 and 3 to be developed immediately, and are proposed to be laid during the ensuing year. These branches will supply all the water required for the construction of roads and other works in the two Suburban Schemes, and will also allow of water being made available for plot-owners, when they start building along the new roads. The mains now laid will, it is hoped, meet the demands of the already built up areas, besides those of Suburban Schemes Nos. 2 and 3, for about ten years to come. Applications for water connections from the residents of Chembur are being received, and it is expected that the number of such applications will considerably increase.

58. The water required for the construction of roads in Suburban Scheme No. 7 (Khar) was supplied by means of a temporary line of 1½″ piping. The roads having been practically completed, the pipes will be utilised, as far as possible, for the supply of water required by plot-owners for building purposes, pending the installation of the permanent scheme. Three hydrants for the supply of water for watering the Bandra Ghodbunder Road were provided at Bandra, Khar and Santa Cruz during the year, together with storage tanks for the use of steam lorries and road rollers at Santa Cruz and Andheri.

59. *Suburban Scheme No. 20—Khopoli.*—Early in 1920 Government in the Revenue Department entered into an agreement with the Khopoli Land Company, Limited, for the grant to the latter of the right to the tail water from the power-house of the Tata Hydro-Electric Power Supply Company, Limited, at Khopoli, with a view to the utilisation of the water for industrial and other purposes. The matter was subsequently reconsidered and, by arrangement with the Khopoli Land Company, their rights and assets were surrendered to Government in return for a payment of Rs. 2,72,564-13-4 as compensation. This

amount was debited in 1922 to the Bombay Development Scheme, and the right to the use of the tail water in question now vests in the Development Department. No schemes involving the use of this water are at present contemplated, but it forms a valuable reserve for future development purposes.

THE ORGANISATION OF THE SUPPLY AND TRANSPORT OF BUILDING MATERIALS.

60. During the year under review there was a considerable expansion of the business of the Materials Division owing to increased demands from consuming divisions, demands which were, however, satisfactorily met.

61. *Shingle and Sand.*—Reference was made in last year's report to a proposal for developing a source of supply at Dahisar on the Vaitarna River. This project on examination proved to be somewhat expensive; but, even before this was definitely ascertained, it was found that the more logical proposition was to establish the new depot at Bhaynder on the Bassein Creek. The reason for the growth of the business at Mumbra is that the material is obtained at low water between Mumbra and Bhaynder, and is naturally carried by boat up stream with the tide to Mumbra. As mechanical dredging is about to be adopted, which will allow work to be carried on at all states of the tide, it is clear that, for economy of transport, equal quantities of the out-turn should go to Mumbra on the flood, and to Bhaynder on the ebb. Proposals for providing a suitable landing and despatching station at Bhaynder are under discussion with the B. B. & C. I. Railway. The proposal to employ two suction dredgers has been modified in consultation with the Director General of Stores and one dredger, of the bucket ladder type with a capacity of 20,000 cubic feet per day, has been substituted and is expected shortly. The dredger will be provided with a rotary screen, which will separate the sand from the shingle and that again from the oversize material, and with water jets to ensure that the first of these processes is effectively carried out. The consumption of these materials has increased enormously, the total quantities supplied during the year being—

Sand	..1,101,662	C. ft.
Shingle	..1,458,187	„

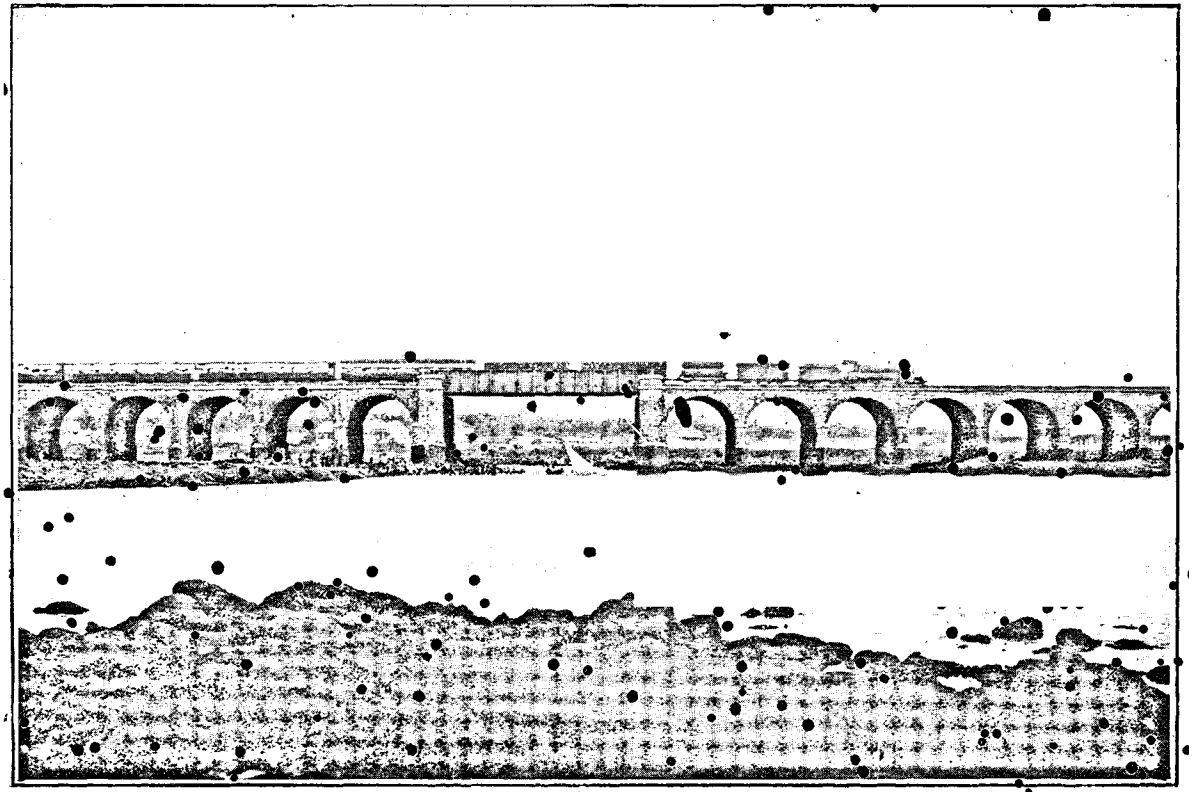
It is anticipated that, when the dredger starts working, the supplies of the Improvement Trust will be added to those of the Directorate. They are already being handled in part, as well as the requirements of the Military Lands Scheme.

62. *Cement.*—The arrangement forecasted last year has come into being, and supplies have been contracted for from a group of Indian Cement Companies for a period of ten years at a price based on manufacturing costs. Provision has been made for the test and analysis of the material by Messrs. Day and Mitchell, a firm of consulting industrial chemists, and samples are being taken at the works and passed before deliveries are made. The requirements of the Military Lands Scheme have been added to those of the Directorate, the total consumption during the year being 14,378 tons. For next season the requirements are estimated at 35,000 tons.

63. *Stone.*—The tests referred to in last year's report were utilised in selecting the class of machine to be ordered for providing chips for surfacing roads in Salsette, and even on this small order the expense of the tests has been justified. The crucial point, however, with machinery of this kind is the cost of replacement of the wearing parts, which has proved to be excessive in some plants that otherwise appeared to be suitable.

64. *Bricks.*—The Wasind brick-fields have proved to be a moderate success. With the approach of the hot weather, attempts to mould without paddy husk failed, and the usual mixtures had to be resorted to. The kilns were worked during the year and bricks were supplied to the 2nd Division, but, as brick-work has been practically eliminated from the chawl design, it is improbable that the demand in sight will warrant the continuation of the kilns during the next season. A considerable area in the neighbourhood of Kalyan was thoroughly prospected during the year, with a view to locating sources of supply of material suitable for the machine manufacture of bricks. Trials made in the experimental plant of the pottery expert showed that a very high class of brick could be produced in certain areas, but so far there have not been signs of a demand sufficient to warrant the outlay necessary to set the manufacture on foot.

65. *Steel.*—The provision of steel for the chawl reinforcement has been a matter of considerable anxiety during the year, as economies in the chawl design have led to changes in the sections employed, and this, in the early stages, precluded the placing of large forward orders. The design has now been standardised, however, and supplies ordered through the High Commissioner, should suffice up to the end of 1923, the Tata Steel Works having intimated their inability to supply the Directorate before 1924. The total quantity of steel consumed during the year was 1,555 tons.



Improving the channel connecting the Thana Creek and Ulhas River at Thana. View from south of G. I. P. Railway Bridge.

66. *Timber.*—The amount of timber in the standard chawl design has been greatly reduced, and the remaining small quantity is now included in the building contracts. No satisfactory local substitute has been found for Oregon pine for the construction of the gantry at Marine Lines.

67. *Transportation.*—The sidings at De Lisle Road were completed and brought into use during the year and have greatly facilitated progress, the tonnage handled up to 31st March being 9,407 tons. The siding from Mahaluxmi to Worli commenced operation in December 1922, and by the end of the year had carried 10,823 tons. A siding is being constructed by the G. I. P. Railway to serve a group of chawls, to be built on land leased from the Port Trust, near the new cotton green at Sewri; and plans for another, to serve the chawl area at Dharavi, have been prepared. Experience has shown the great economy of these facilities as compared with road transport, and their effect on the quicker out-turn of work can hardly be over estimated.

68. The 150 broad gauge wagons were delivered early in the year and were hired to the G. I. P. Railway under Indian Railway Conference Rules. In return for the use of the wagons the Railway Company give a guarantee of an equivalent daily tonnage of carrying capacity for building materials, which has proved of the greatest value. In view of the expansion of business, and of the excellence of the investment, a further provision of these wagons has been proposed and is under consideration.

69. *Steam Lorries.*—The twelve steam lorries referred to in the last report were increased to eighteen during the year, including two very efficient water carts, and the six trailers to twelve. During the year 99,692 tons were carried, and the work done amounted to 2,92,943 ton miles. The cost of running amounted to Rs. 1,62,862, equivalent to Re. 1·63 per ton or 0·56 per ton mile, and the receipts to Rs. 1,14,481. The rates for carriage have been revised and are now Rs. 2 per ton up to five miles, and Rs. 65 per lorry day for distances over five miles. It is calculated that, at these rates, receipts will balance expenditure.

70. *Road Rollers.*—The maintenance and running of road rollers is also part of the work of the Mechanical District of the Materials Division, the rollers being hired out to other divisions of the Directorate as required. There were 22 rollers employed during the year, and 2,267

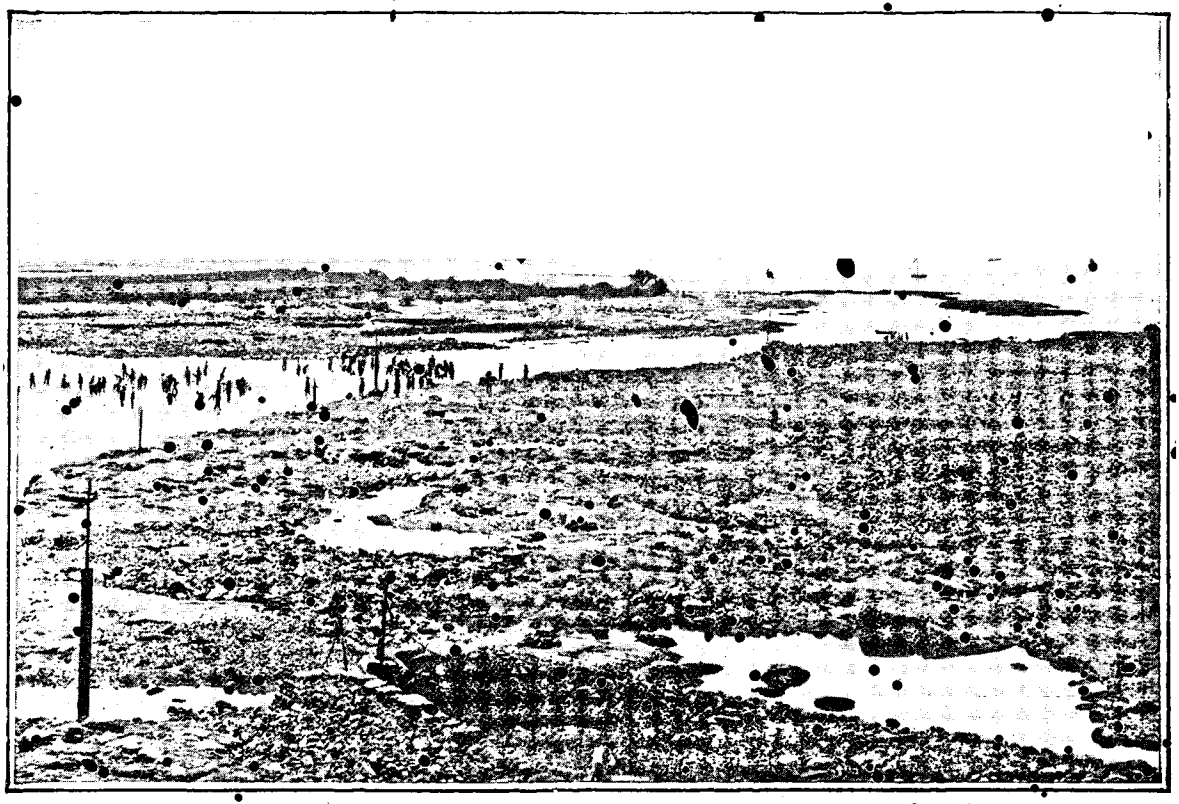
roller days were worked at a cost of Rs. 87,660, the receipts being Rs. 87,764.

71. *Waterway at Thana.*—This work, referred to in last year's report, was undertaken during the year and was practically completed by 31st March 1923. It is not a heroic project, consisting of less than one lakh c.ft. of rock cutting, largely the removal of isolated projections, but none the less tedious being almost entirely tide work. The general alignment is shown on plate V, from which it will be seen that what has been done is merely to improve the previously existing, somewhat tortuous, channel, so as to make it safe for the country craft which use it. A barge of 150 tons, belonging to the Directorate, has been taken through the improved channel; but, if barge traffic were to develop to any extent, it would be a simple matter to cut a new, and more direct, channel, provided sufficient revenue were in sight to warrant the expenditure. The cost of the work is estimated at Rs. 36,000 which will be covered by the levy of a toll of 1½ annas per ton on boats using the channel, which is calculated to produce an income of Rs. 12,800 per annum on the present traffic. Even taking Rs. 40,000 as the actual expenditure on completion, the work will be remunerative, as shown below :—

	Rs.
Capital Cost	40,000
Maintenance, including lighting, per annum.	7,200
Replacement, etc.	800
Interest at 7 per cent.	2,800
Sinking fund on 30 years' basis at 7 per cent.	424
	11,224
Estimated Receipts ..	12,800
Surplus per annum ..	1,576

BOMBAY SUBURBAN SURVEY.

72. It was decided to await the completion of the 16-inch to the mile survey before printing any of the sheets, and, as an extension of the area to be surveyed was decided on during the year, it was not until 1st March 1923 that the survey was completed. The area surveyed during the year amounted to 21,495 acres, or 33·5 square miles, and arrangements were being made at the close of the year for printing the sheets. A reduction of this map on a scale of 4 inches to the mile was also undertaken during the year, and was nearly completed by the end of March.



Improving the channel connecting the Thana Creek and Ulhas River at Thana. Looking south from Railway Bridge.

73. In addition to the above maps, it was decided during the year to carry out a 40 feet survey of some of the existing closely built up areas in Salsette, such as Bandra; and, as town planning and suburban schemes approach completion, it is intended to survey them also on the same scale, so that accurate details of plot boundaries, etc., may be available. A specimen sheet of the 40 feet survey, representing part of Bandra, accompanies this report as plate VI.

74. *Rapid Transit in Bombay.*—On the occasion of his visit to Bombay, last cold weather, Mr. W. R. Davidge, Consulting Town Planner, was asked to record his impressions on the rapid transit problem as applied to Bombay and its suburbs, and a preliminary report which he has submitted is printed as Appendix B to this report. There will probably be general agreement with the conclusion that any form of overhead railway must be ruled out of court; and, apart from the existing railways, relief would appear to lie in the direction of an underground railway system, overhead motor roads, trams running on reservations, and buses. The underground railway is an obvious remedy, of which numerous examples exist, but its practicability in Bombay from the engineering and economic aspect has yet to be demonstrated. The idea of a high level roadway, say from Dhobi Talao to Jacob Circle, confined to the use of mechanically propelled vehicular traffic, is an attractive proposition. But in either case the expenditure involved would be very considerable, and whilst it is useful to promote the discussion of such future possibilities, it may be feared that actual realisation must await a later stage in the process of development.

ADVISORY COMMITTEES.

75. During the year, the system of holding joint meetings of the Advisory Committees for Bombay City and Suburbs was continued with advantage, and the deliberations of the Committee ranged over a number of the more important questions connected with the work of the Directorate. Visits of inspection were also paid to the reclamation and housing schemes. A list of the members of the Advisory Committees, during the year, is given as Appendix C.

ORGANISATION OF DIRECTORATE.

76. The organisation of the Directorate is shown in Appendix D to this report.

H. A. L. HEPPER,

Director of Development.

APPENDIX A.

SCHEME B 2—HOUSING (NAIGAUM).

Plot A—19 Blocks of 80 tenements each.

Estimated economic rent per room.

		Rs.
Capital Cost—		
(1)	Land purchased from Improvement Trust, 32,523 square yards at Rs. 13	4,22,799
(2)	Chawl construction—19 chawls (1,520 rooms at Rs. 1,350)	20,52,000
(3)	Roads, drainage, water supply, etc.	1,94,000
(4)	7½ per cent. on (2) and (3) for establishments, etc. ..	1,68,450
	Total outlay ..	28,37,249
Add	Interest during construction at 7 per cent. per annum on total outlay of Rs. 28,37,249 for 1 year (period of construction being taken at 2 years)	1,98,607
	Total capital cost ..	30,35,856
Interest and Sinking Fund—		
	Interest at 6 per cent. on the total capital cost of Rs. 30,35,856	1,82,151
	Sinking fund at 0·35 per cent. on the cost of the buildings (Rs. 20,52,000)	7,182
	Total ..	1,89,333
Net Rent—		
	Net monthly rent required to cover cost—Rs. 1,89,333 ÷ 12	15,778
	Net monthly rent per tenement—15,778 ÷ 1,520	10·38
Out-goings—		
Add	Fixed charge of Rs. 2 per mensem for repairs and management (see note (*a*))	2.
		12·38
	Allowing 16 per cent. of gross rent for variable charges (see note (*b*)).	
Economic Rent—		
	The economic rent is $12 \cdot 38 \times \frac{100}{84}$	14·74

(*a*) REPAIRS AND MANAGEMENT.

Repairs.

	Rs.
Cost of 19 chawls	22,46,000
Cost of repairs per annum at 1 per cent.	22,460
Cost of repairs per mensem	1,871

MANAGEMENT.

Estimated cost per mensem of—	Rs.	
Establishment	1,000	1,250
Sanitary Stores	250	
Total repairs and management ..		3,121

Or say Rs. 2 per room per mensem on 1,520 rooms.

(*b*) VARIABLE CHARGES.

Taxes.

	per cent.
General tax 8/10ths* of 11 per cent.	8·8
Fire tax	·5
Water tax	3·75
Halalkhor tax	3·00
	16·05
9–10ths † of 16·05 per cent. = 14·445 per cent. or say	14·45
Vacancies, bad debts and insurance	1·55
Total ..	16

* Section 144 (3), Municipal Act.

† Section 154, Municipal Act.

APPENDIX B.

Copy of the report by Mr. W. R. Davidge, Consulting Town Planner, on the question of rapid transit between Bombay City and the Suburban Area.

In accordance with the instructions received during my recent visit to Bombay I have the honour to submit the following preliminary report upon the question of rapid transit between the suburban area and Bombay City.

In the terms of reference I am asked to report on the whole question, not only from the point of view of present conditions, but with a view to the possibilities of the future.

I have, therefore, to take into consideration, not only the conditions immediately present, but those likely to take place in the near future, when the large areas of suburban land now in process of development, are brought into use, either for residential or business purposes.

It will also be remembered that both these questions are bound up with one another, so that not only is it true to say that traffic depends upon the amount of suburban development, but it is equally true that both the area and the extent of the land brought into actual use depend upon the transit facilities available.

A study of the past development of Bombay, together with other large cities, will make it abundantly clear that the lines of development have, in practically every case, followed the lines of the means of transit. Villages always tend to grow along the main roads, and suburban communities spring up around railway stations wherever the situation and the service are sufficiently attractive.

As was pointed out in the last Report of the Directorate, all development must be based on railways and, with the electrification of the suburban services in the near future, a great transformation may be expected in the whole outlook, and the rate of suburban expansion will inevitably rapidly increase. It is, therefore, well that the whole question should be taken into consideration at the present juncture.

PRESENT CONDITIONS.

A short summary of present conditions of transport in and around Bombay is as follows :—

Railways.—Of the two railways at present serving Bombay, the G. I. P. is the larger and probably more important, so far as long dis-

tance traffic is concerned, but its suburban traffic is comparatively small, and limited largely to the Island of Bombay itself.

The opening of the Harbour Branch is likely to considerably increase the passenger traffic into Victoria Terminus and, taken in conjunction with the new line of the Development Department, in Salsette and Trombay is certain to carry a large amount of suburban traffic.

The B. B. & C. I. Railway has for many years had a large and increasing suburban business, but even this is comparatively insignificant, compared with the possibilities of the immediate future, when Salsette, and especially the western district, comes into even more intensive use following upon the development now being carried out by the Directorate and the electrification of the suburban portion of the line.

Tramways.—The tramways in Bombay serve only a comparatively small area in the vicinity of the City proper. The service is slow and liable to be seriously blocked at any time in the many narrow streets of the bazaar. Under such conditions, the speed limit is necessarily low and the congestion of traffic in places unusually severe.

In the layout of the Ward Scheme, it will be remembered that the Bombay Improvement Trust have reserved a special track for tramway purposes. This is, in my opinion, the right principle to adopt and, wherever possible, in the event of further tramway extensions either on the Island of Bombay or in Salsette, such special reservations should be set aside for the use of the tramway.

Only by running on special tracks away from the general traffic, can a really speedy tramway service be provided, and if the tramways of Bombay are to be further extended and improved, some means of increasing the speed must be found, at any rate in the more open parts of the area.

The light railway between Cologne and Bonn, or that between Lille and Tourcoing and Roubaix, will serve to illustrate this point. In these cases a high speed is reached in the open country, but the cars slow down to become ordinary tramcars in the narrower streets of the towns through which they pass.

Motor Omnibuses.—At present there are no motor omnibuses in use in Bombay, and these vehicles are probably hardly suitable for the routes at present served by the Tramway Company's undertaking.

It is, however, worth consideration whether a single deck service of motor buses, say a 5 minutes service each way might possibly be run between Malabar Hill and the Fort, and also on the Back Bay Reclamation when completed.

In the northern portion of the Island and in the Suburban areas of Salsette, such a motor bus service would be invaluable as a feeder to the railways. The roads here are in most cases sufficient for such a service, so far as width is concerned, though it may be found desirable to improve the road surfaces by an extended use of tar macadam or similar material.

Suitable routes (starting from Dadar or Mahim) would be

(*a*) along the Ghodbunder Road to Andheri,

(*b*) along the Bombay-Agra Road to Ghatkopar and on the cross routes, such as

(*c*) along the military road from Santa Cruz.

Roads.—At present there is only one good road out of Bombay, *viz.*, via Hornby Vellard and Mahim and even this is much congested on the Mahim Causeway, which badly needs widening. The eastern side of the Island will shortly be well served by the extension of the new King's Way, so far as the northern portion of the Island is concerned. While the congestion through the bazaar, however, exists, this fine roadway will not be of the full service which it deserves to be, as a means of egress from the City.

CONGESTION THROUGH THE BAZAAR.

It is very obvious to the most casual observer that drastic means will have to be undertaken in the near future to provide one or more thoroughfares of ample width right through the more congested portions of the City. At present the loss to the community in traffic delays is incalculable, and probably far outweighs the annual charges which would be incurred by any scheme of improvement, however great.

The new Sydenham Road, when completed, will be of service in providing access to the Parel Road, but it will be remembered that this road is already seriously overcrowded, and further measures of improvement will have to be considered.

The construction of a new road northwards from Esplanade Road in the direction of the Parsi Statue would considerably relieve the existing pressure, but it will be evident that to be fully effective, such a road should be continued to Jacob's Circle or even beyond.

Overhead Motor Ways.—A suggestion which has been made in a number of cities is for an overhead motor-way carried on a special viaduct, either along the centre of a wide new thoroughfare or on an entirely separate track, the arches underneath in such a case being utilised for warehouses or similar purposes. So far as I am aware, there is no actual example of such a roadway having been constructed, but an elevated motor road of this description, limited to mechanically propelled vehicles, has recently been suggested in London as a commercial proposition, and the motor-way suggested some years back from London to Brighton was a special track of this description.

Such a proposal would, of course, require to be worked out in careful detail, especial regard being given to the financial aspect. From an engineering point of view, however, there is little doubt that the proposal is an entirely feasible one, and if the overhead viaduct was constructed in concrete or stone on the lines of the overhead lines in Berlin, or the railway viaduct in Antwerp, the viaduct might well be a thing of beauty.

Special Road for Motor Traffic.—Meanwhile, however, I would suggest that it should be possible, as an experiment, to entirely exclude bullock wagons and horse drawn vehicles from one or more selected streets, and to limit the use of such streets to mechanically propelled vehicles.

The streets chosen would, of course, be those where alternative routes exist for the slower moving traffic. Even under present conditions, much could undoubtedly be effected by prescribing particular streets to be followed by up and down traffic, thus removing the continual blocking of narrow streets by bullock wagons.

FUTURE POSSIBILITIES OF SUBURBAN TRAFFIC.

As has already been pointed out, the possiblity of suburban expansion under reasonable and proper conditions is almost entirely dependent upon railway communication.

The new extension of the standard gauge line to Trombay will serve the Trombay industrial area.

The Development Department's new railway from Andheri to Kurla and Trombay will open out entirely new territory and will undoubtedly

attract a considerable population to the stations on its route, but it will still be desirable to leave green belts of agricultural land between the various new communities which will shortly spring up around the stations.

The further extension of the development line to the sea coast on the west is desirable in order to provide both for residential and pleasure traffic. The line will also prove of use as a means of gathering and distributing materials for constructional purposes.

It should also be kept in view that the line is of the same gauge as the Port Trust's railway to Anik and the linking up of the lines southward of Chembur would afford direct communication from the new Cotton Green at Sewri to Trombay and Salsette, as far as Andheri and beyond.

ELECTRIFICATION OF RAILWAYS.

The electrification of all suburban lines in the near future will render possible direct communication of the suburban districts with any underground system which may hereafter be introduced in the City proper.

UNDERGROUND RAILWAYS *versus* OVERHEAD RAILWAYS.

An underground railway for the Fort and adjoining business and commerical districts of Bombay would undoubtedly meet a considerable want and there is every probability that the amount of traffic will before long justify the consideration of such a railway. I have carefully considered the circular route suggested by the Engineer to the Muncipality and find myself in general agreement therewith, subject to the electrified suburban traffic being free to circulate through the whole of the City underground circle.

I have considered the possibility of an overhead railway in lieu of the suggested underground line, but in view of the experience of American and other cities where this system has been introduced into narrow or comparatively narrow streets, I am unable to recommend its adoption. The same objection applies to overhead railways of the suspended type, such as the well-known example of the Elberfeld-Barmen Railway, although in this latter type, the objections from noise and obstructions of lights are reduced to the minimum.

From the point of view of appearance, any form of overhead structure, unless constructed as an entirely separate route, or as part of a very wide boulevard, is likely to be objectionable, and I therefore feel that in

considering the problem of railways in the centre of Bombay, the underground system is the only one that can be considered.

GENERALLY.

The need for rapid transit in Bombay is very apparent and the conclusions arrived at may well be summarised as follows :—

1. Railway communication is all important, but cannot be considered as a separate problem apart from roads and other means of communication.

2. Subsidiary means of communication, such as trams and motor omnibuses should be encouraged in the outlying areas as feeders to the more rapid means of transit.

3. A definite scheme of main thoroughfares through the congested areas should be prepared, in conjunction with the railway authorities, with a view to the provision of the best route for a circular underground railway in the City of Bombay, linked up with the electrified suburban services of both the B. B. & C. I. and the G. I. P.

APPENDIX C.

Members of the Advisory Committees for Bombay City and Suburbs for 1922-23.

BOMBAY.

	Name of Member.	Constituency.
1.	Dr. Nadirshaw H. E. Sukhia, L.M. & S., L. V. Sc. (Spl.), F.R.S.I. (London).	Bombay Municipality.
2.	*Fazal Ibrahim Rahimtulla, Esq. . .	Do.
3.	†E. G. Turner, Esq., I.C.S. . .	City Improvement Trust.
4.	‡F. A. H. East, Esq.	Bombay Chamber of Commerce.
5.	Jehangir Bomanji Petit, Esq., M.L.C.	Bombay Millowners' Association.
6.	Lalji Naranji, Esq., M.L.C. . . .	Indian Merchants' Chamber.
7.	§L. U. Mongini, Esq.	Bombay Presidency Trades' Association.
8.	S. K. Bole, Esq., M.L.C.	Working Classes.

BOMBAY SUBURBAN REVENUE DIVISION.

1.	F. A. C. Rebello, Esq., B.A. . .	Bandra Municipality.
2.	J. S. Pereira, Esq.	Kurla Municipality.
3.	P. J. Vakil, Esq., B.A., LL.B. . .	Ghatkopar-Kirol Municipality.
4.	Moreshwar Vishwanath Pradhan, Esq., B.A., LL.B., M.L.C.	Notified Area Committees.

* During the absence of Mr. Fazal Ibrahim Rahimtulla from May to November 1922, the Municipal Corporation elected Dr. Dinshaw Bomanji Pestonji Master, L.M. & S., to act on the Committee.

† During the absence on leave of Mr. E. G. Turner, I.C.S., from February to October 1922, Mr. H. A. Delves acted on the Committee.

‡ During the absence of Mr. F. A. H. East from April to November 1922, the Chamber of Commerce elected Mr. E. C. Reid to act on the Committee.

§ During the absence of Mr. L. U. Mongini from June 1922 to the end of the year, the Bombay Presidency Trades' Association elected Mr. F. W. Petch to act on the Committee.

APPENDIX D.

Development Directorate.

	Designation.	Name.
1.	Director of Development ..	Sir Lawless Hepper, Kt.
2.	Deputy Director of Development, Secretary to Government, Development Department and Commissioner, Bombay Suburban Division.	P. W. Monie, Esq., C.S.I., I.C.S. (on leave); J. R. Martin, Esq., I.C.S. (acting).
3.	Deputy Secretary to Government, Development Department, Secretary to the Development Directorate and Assistant to the Commissioner, Bombay Suburban Division.	H. St. C. Smith, Esq.
4.	Assistant Secretary to Government, Development Department.	R. B. Vachha, Esq., M.A.
	Reclamation Branch.	
5.	Chief Engineer, Reclamation Branch.	Ll. W. Lewis, Esq., C.I.E., M.I.C.E.
6.	Senior Deputy Chief Engineer, Reclamation Branch.	G. M. O'Rorke, Esq., C.I.E., M.B.E., B.A.I., A.M.I.C.E.
7.	Junior Deputy Chief Engineer, Reclamation Branch.	H. A. Elgee, Esq., M.I.C.E.
8.	Junior Deputy Chief Engineer, Reclamation Branch.	P. Billinton, Esq.
9.	Personal Assistant to the Chief Engineer, Reclamation Branch.	Vacant.
10.	Executive Engineer, Projects ..	W. H. Thomas, Esq., A.C.G.I., A.M.I.C.E.
11.	Executive Engineer, Reclamation Branch.	W. F. Anderson, Esq.
12.	Marine Surveyor ..	G. D. Kundaji, Esq., M.R. San. I (Lond.)
13.	Assistant Engineer ..	C. G. Croudace, Esq. (on leave); G. H. R. Sproule, Esq. (acting).
14.	Assistant Engineer ..	S. M. Abdulla, Esq.
15.	Assistant Engineer ..	A. N. Seal, Esq., B.Sc. (Lond.)
16.	Assistant Engineer ..	M. A. Ghani, Esq.
17.	Quarry Master ..	E. O. Roberts, Esq.
18.	Mechanical Engineer, Quarry ..	A. Bellefontaine, Esq.
19.	Dredging Master ..	W. S. Spiers, Esq.

APPENDIX D—*contd.*

DEVELOPMENT DIRECTORATE—*contd.*

	Designation.	Name.
	No. 1 PROJECT DIVISION.	
20.	Superintending Engineer, No. 1 Project Division.	T. Harvey, Esq., M.Sc., M.I.C.E.
21.	Executive Engineer, Bombay Housing District No. 1.	N. L. Mehta, Esq., B.Sc. (Lond.), D.Sc. (Paris).
22.	Executive Engineer, Bombay Housing District No. 2.	A. Hamid, Esq., F.Sc.
23.	Executive Engineer, Bombay Housing Sanitary District.	Rao Saheb P. S. Krishnaswami Ayyar.
24.	Personal Assistant to the Superintending Engineer, No. 1 Project Division.	Vacant.
25.	Assistant Engineer, Bombay Housing District No. 1.	S. P. Raju Iyer, Esq.
26.	Assistant Engineer, Bombay Housing District No. 1.	M. A. Dhoria, Esq., B.A., B.E.
27.	Assistant Engineer, Bombay Housing District No. 1.	B. R. Sahni, Esq., A.M.I.C.E.
28.	Assistant Engineer, Bombay Housing District No. 2.	S. S. Rajadhyksha, Esq.
29.	Assistant Engineer, Bombay Housing District No. 2.	M. H. Guzdar, Esq., B.E., M.R. San. I., A.M.I.E.
30.	Assistant Engineer, Bombay Housing District No. 2.	S. G. Naravane, Esq. (E.M. Columbia University, New York).
31.	Assistant Engineer, Bombay Housing Sanitary District.	M. R. Bedy, Esq.
	No. 2 PROJECT DIVISION.	
32.	Superintending Engineer, No. 2 Project Division.	D. R. H. Browne, Esq., O.B.E., A.K.C.
33.	Executive Engineer, Andheri District.	D. K. Bhave, Esq., L.C.E., M.A., B.Sc., A.M. Inst. C.E., A.M.I. Mech. E.
34	Executive Engineer, Suburban Sanitary District.	T. S. Soorma, Esq., B.E.
35.	Executive Engineer, Kurla Trombay District.	G. W. T. Squires, Esq.
36.	Assistant Engineer, Chembur ..	B. M. Flores, Esq., B.E.
37.	Assistant Engineer	Rao Saheb K. C. Advani, L.C.E.

APPENDIX D—*contd.*

DEVELOPMENT DIRECTORATE—*contd.*

	Designation.	Name.
	No. 3 PROJECT DIVISION.	
38.	Superintending Engineer, No. 3 Project Division.	A. F. Macdonald Clark, Esq., M.A., B.Sc., M.I.C.E.
39.	Electrical and Mechanical Engineer.	A. Lennox Stanton, Esq., M. I. E. (India), M. Ams. M. E., A.M. M.E., A.M.I.E.E.
40.	Executive Engineer, Central Salsette Railway.	T. A. Pereira, Esq.
41.	Executive Engineer, Water Works Scheme, Badlapur.	J. N. Setha, Esq., L.C.E., B.Sc.
42.	Engineer in charge, Ambarnath Development Scheme, Ambarnath.	H. K. Vacha, Esq., B.A., B.E.
43.	Assistant Engineer	F. J. Campos, Esq., B.E.
44.	Do.	R. S. Borker, Esq.
45.	Do.	D. D. Joglekar, Esq., L.C.E.
46.	Do.	T. V. Sunderasan, Esq., B.A., B.E.
47.	Do.	J. M. Pandya, Esq., B.Sc. (Edin.)
	No. 4 PROJECT DIVISION.	
48.	Superintending Engineer, No. 4 Project Division.	E. F. Sykes, Esq., M.I.C.E.
49.	Executive Engineer, Mechanical District.	W. K. Caldwell, Esq.
50.	Executive Engineer, Materials District.	J. R. Colabawalla, Esq., M. Soc. E. (Lond.), A.M.I.E. (India), A.Am. I.E.E.
51.	Assistant Engineer	Lala Kanhiyalal.
52.	Do.	Sirdar Kala Singh.
53.	Do.	Nand Kishor Agrawal, Esq.
	SUBURBAN SURVEY.	
54.	Superintendent, Bombay Suburban Survey.	W. J. Newland, Esq.
	LAND ACQUISITION, BOMBAY.	
55.	Land Acquisition Officer for the City of Bombay.	G. C. Rowe, Esq., P.A.S.I.

APPENDIX D—*contd.*

DEVELOPMENT DIRECTORATE—*contd.*

	Designation.	Name.
	LAND ACQUISITION, BOMBAY—*contd.*	
56.	Assistant Land Acquisition Officer for the City of Bombay.	H. V. Date, Esq., B.A.
57.	Personal Assistant to the Land Acquisition Officer for the City of Bombay.	S. D. Nariman, Esq., B.A.
	LAND MANAGER, DEVELOPMENT DIRECTORATE.	
58.	Land Manager, Development Directorate.	Capt. E. M. Gilbert-Lodge, F.S.I., F.I.A., F.A.I.
59.	Assistant Land Manager, Development Directorate.	K. R. Doctor, Esq., L.C.E.
60.	Special Assistant Land Manager, Development Directorate.	D. G. Sowani, Esq., B.Sc., B.E.
	SALSETTE DEVELOPMENT.	
61.	Collector, Bombay Suburban District, and Salsette Development Officer.	G. E. L. Carter, Esq., I.C.S.
62.	Assistant Development Officer, Kurla.	D. M. Randive, Esq., B.A.
63.	Assistant Development Officer, Ambarnath.	P. H. Diwan, Esq., B.A.
64.	Assistant Development Officer, Trombay.	A. K. Nulkar, Esq.
65.	Additional Assistant Development Officer, Trombay.	J. D. Nanavati, Esq., B.A.
66.	Deputy Collector and Personal Assistant to the Salsette Development Officer.	H. C. Fleming, Esq.
	AUDIT AND FINANCE.	
67.	Financial Adviser to Government.	H. Denning, Esq., I.C.S.
68.	Deputy Financial Adviser to Government and Audit Officer, Bombay Development Scheme.	S. M. L. Bean, Esq.
69.	Assistant Audit Officer, Bombay Development Scheme.	R. Hogan, Esq.

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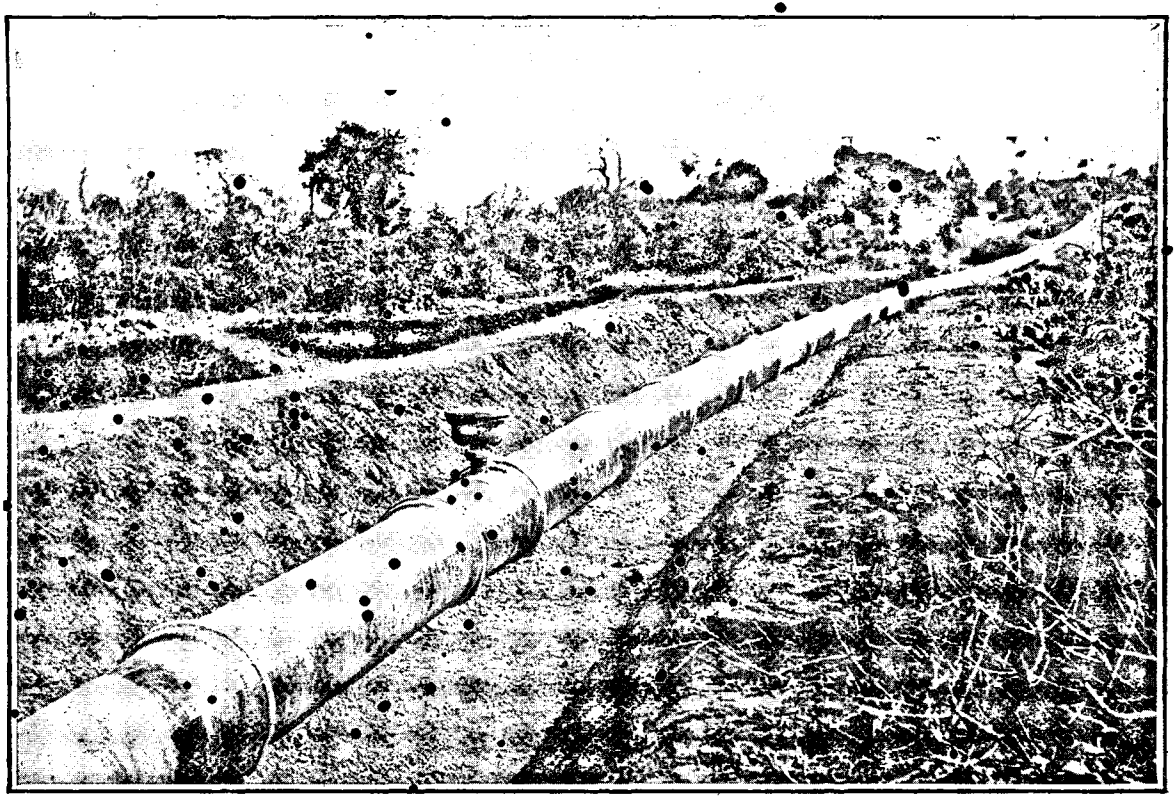

Ambernath Water-Supply. View showing the 27 inch diameter distributing main.

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